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THE UNIVERSITY OF ALBERTA

A STUDY OF THE TEACHING OF SIGHT WORDS TO POOR READERS IN GRADE ONE THROUGH THEIR PREFERRED MODES OF LEARNING

by

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "A study of the Teaching of Sight Words to Poor Readers in Grade One Through Their Preferred Modes of Learning" submitted by Derek Richard Taylor in partial fulfillment of the requirements for the degree of Master of Education.

ABSTRACT

This study investigated the effectiveness of teaching word recognition skills for a period of six-weeks to low achievers in reading in grade one through their preferred learning modalities as identified by the *Mill's Learning Methods Test*. The population for the study was drawn from the total public school grade one population of a small urban centre in north-western Alberta. The study also investigated whether sex or intelligence acted as a significant factor when these students were taught through their preferred modalities as identified by the *LMT*.

Low-achievers in reading were identified by the Gates MacGinitie Reading Test. One hundred and eighteen children were in this category. As a result of visual and auditory screening procedures twenty-six children were eliminated. The remainging ninety-two children were administered the *LMT* which identified sixty as having preferred modes of learning (thirty-three boys and twenty-seven girls). Intelligence quotients were obtained from class records. Consequently, the final test sample consisted of sixty children.

The test population of sixty children was randomly assigned to a treatment or a non-treatment group. The treatment group was taught new words in the grade-one reading program by methods which were tailored to their preferred modalities of learning while the non-treatment group was taught the new words by the usual classroom methods employed by the teacher. Both groups were taught by their regular classroom reading teachers. A second form of the *Gates MacGinitie Reading Test* was administered to both groups at the end of the six-week treatment period to determine the mean-gain reading scores.

The data obtained from the test results were processed by the Division of Educational Research Services at the University of Alberta using analysis of variance, t-test, and multiple linear

regression programs.

The major findings of this study were that although the LMT did identify preferred modalities of learning in some low-achievers, a substantial percentage of these students either did not have a preferred modality or the LMT was not sufficiently discriminatory to identify it. Secondly, for low achievers in reading in grade one, generally, who were taught by methods which were tailored to their preferred modality of learning, a significant improvement in reading skills did not occur. Thirdly, neither intelligence or sex acted as significant factors when pupils were taught word recognition skills through their preferred modalities of learning. Finally, 22 per cent of these low achievers in this grade one population had visual or auditory difficulties or a combination of both.

This study has given some guidance as to the relative importance of early identification of children in grade one who have visual or auditory difficulties. In addition the findings of the study have some implication for teacher-education institutions. Teachers should be taught to become increasingly aware of the individual differences among grade one beginners and know how to adapt methods and materials to tailor their programs for these individual differences. Administrators must also be alert to the importance of this concept and be willing to encourage teachers to make the necessary adaptation and provide the staff and budget to enable this to be carried out.

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CHAPTER I

THE PROBLEM

I. GENERAL STATEMENT OF THE PROBLEM

Knowledge of the environment is obtained, primarily through some sensory modality. An individual becomes aware of a sensory excitation which he attempts to identify. Thus, the first step in perception is receiving a sensory impression from the thing that will be perceived. This initial sensory stimulus occurs by seeing, hearing, touching, tasting, or smelling.

Reading involves the interpretation of graphic symbols, so it follows that the first and most basic stage of reading necessitates the reader receiving through some sensory modality an awareness that there is something to be read. Whether the reader becomes aware of a letter, a cluster of letters, or a phrase, he must become aware first of all through some sensory excitation that the letter symbols are within his perceptual field. It also follows that the reader can use one or a combination of sensory modalities to aid in the identification of the written visual symbol. Various methods of teaching word recognition skills have been based on this assumption (Daniels and Diack, 1959; Fernald and Keller, 1921; Mills, 1956).

Research has also demonstrated that children appear to develop modalities through which they prefer to learn (MacAulay, 1965; Mills, 1956). For example, some children in responding to sensory stimuli may invoke visual images; other children may invoke auditory images, and yet other, tactile images. Researchers have classified such children as "visiles", "audiles", and "haptics" respectively

(Freud, 1953; Money, 1962). Some children have the ability to invoke combinations of images, and could be classified as "eclectics".

It appears that some children beginning school may have preferred modalities which they use to recognize graphic symbols. Some diligently choose a particular type of imagery although, no doubt, many children have enough flexibility to adapt their particular styles of perceiving to different situations and different materials.

If, however, some children lack this flexibility and have a modality through which they prefer to learn, this concept is relevant to primary teaching. If in the teaching of reading, for example, means of differentiating these children into their perceptual types could be devised, the best method of teaching these children word recognition skills initially could be one which caters to the sensory modes through which they prefer to learn. This being so, determining the sensory pathways through which children prefer to learn is important for educational practice.

Since studies have demonstrated that children may have modalities through which they prefer to learn by the time they start school (MacAulay, 1965), it might be preferable to teach word recognition skills initially by using techniques which can be adapted to these modality distinctions. However, in many schools this approach is not used, and it may be that this is a contributing factor in the reading difficulties of children who have developed sensory pathways through which they prefer to learn and which differ from those emphasized by the teacher.

Wepman (1960, p.25) discusses the importance of this concept:

> Major differences do exist at the perceptual level of learning which may materially affect their learning; that these differences are fundamental to learning; that they underlie the conceptual level and provide the basic precepts upon which concepts are built; and that they must be understood and clarified before the conceptual level is focussed upon.

At present, many beginning reading teaching methods in Alberta are based upon a visual-auditory approach, a method which initially relies almost exclusively on the eye as the receptor of and the means of interpreting the printed visual symbol, although many basal readers do provide opportunities for such auditory experiences as identification of initial sounds, ending sounds, rhyming words and some oral reading.

No doubt many children who prefer a sensory modality other than the eye learn to adapt in the classroom to a visual-auditory method of teaching sight words. However, the inability to make this adaptation could be a contributing factor in some children's reading difficulty. Children beginning school could be grouped on the basis of ability to adapt to the usual reading teaching techniques. Children who cannot adapt could be regrouped later on the basis of adaptation to the teaching technique which was tailored to their particular preferred modality. The time element between recognition and identification of modality distinctions between children and the development of appropriate teaching reading programs for them could be crucial to success in reading. In other words, if children start school with a sensory pathway through which they prefer to learn, and if they are taught to read by a method which relies almost exclusively on another sensory pathway, they may fail to make the necessary adjustments in time to prevent reading difficulties.

Spache (1955, p.55) argues that since the teaching of reading is based more and more on a visual approach, a certain proportion of children for whom this modality is not the preferred one may become

reading problems. He is supported by Burt (1946, pp. 116-132) who suggests that in a school where one method of teaching reading is used exclusively, the low-achievers in reading may be those children who because of some individual differences or interests do not adapt readily to that particular technique.

II. PURPOSE OF THE STUDY

The purpose of this study was to identify the modality of perception that school children who were low-achievers in learning sight words in grade one prefer to use, and to investigate whether these children performed better after being taught by a method which allows more extensive use of their preferred modalities. More specifically, the study attempted: (1) an identification of low-achievers in learning sight words after eight months in grade one, (2) an identification of their preferred modes of learning, and (3) an investigation of whether these low-achievers in sight word identification performed better after being taught sight-words by a method which was tailored to their preferred modalities.

III. DEFININTIONS OF TERMS

The following terms are defined as they are used in this study:

1. Preferred Modality: The sensory pathway through which a child prefers to learn as identified by the Mill's Learning Methods Test, hereafter known as the LMT (Appendix A).

The four teaching methods as outlined by the LMT are:

2. Visual Teaching Method. The teaching of word skills relies primarily on the eye as the receptor and the following means of interpreting the printed symbol stimulus through

utilization of the following teaching techniques: (1) stressing the general configuration of the word, (2) stressing a careful visual study of the word, and (3) using picture-word association methods.

3. Phonic Teaching Method. The teaching of word recognition skills stresses primarily the sound quality of words through the use of the following teaching techniques: (1) printing the word and then saying the word as a model for the child to follow, (2) teaching the sounds of the individual letters within the word in sequence for the child to repeat, (3) blending the sounds into a unified complete word as a model for the child, and (4) stressing the rhyming elements of the words, its initial consonant sound and other such parts of the word.
4. Kinesthetic Teaching Method. The teaching of word recognition skills utilizes the child's sense of touch and movements of the lips as a cue in learning to recognize words. The following teaching technique is used: (1) printing of the word from the model, (2) tracing of the word by the child with his fingers, and (3) saying the word as he writes it.
5. Combination Teaching Method. The teaching of word recognition skills emphasizes each of the visual, auditory, and kinesthetic approaches. The visual, phonic, and kinesthetic techniques as outlined above are combined into an eclectic method. This eclectic method utilizes the following techniques: (1) recognizing the word through picture-association, (2) sounding the word with emphasis being given to initial and ending letters, and (3) tracing the word by the student as he says it.

Perceptual types of students as identified by the LMT are:

6. Audile. An audile is a child who has been identified by the LMT as having developed a preferred mode of learning which relies heavily on the hearing of the word.

7. Haptic. An haptic is a child who has been identified by the LMT as having developed the kinesthetic as his preferred mode of learning. This is the child who learns better through an approach which stresses touch.

8. Visile. A visile is a child who has been identified by the LMT as having developed a preferred mode of learning which relies heavily on the eye as the receptor of stimuli.

9. "Eclectic". An "eclectic" is a child who has been identified by the LMT as having developed a preferred mode of learning which is a combination of methods. This child learns through a auditory approach, a visual approach, and a kinesthetic approach.

IV. QUESTIONS TO BE INVESTIGATED

In light of the statements in the preceding sections, the following questions were selected to be investigated in this study:

1. Do children taught word recognition skills by methods which are tailored to their preferred modalities of learning perform better than those taught by methods which do not capitalize on their preferred modalities?

2. Is intelligence a significant factor when children are taught word recognition skills by methods which are tailored to their preferred modalities of learning?

3. Is the sex of the children a significant factor when they are taught word recogniton skills by methods which are tailored to their

preferred modalities of learning?

V. HYPOTHESES

To answer these questions the following null hypotheses were formulated and tested in this study:

1. There are no significant differences between the mean-gain reading scores of grade-one children low in reading achievement who are taught by a method which is tailored to their preferred mode of learning and the mean-gain reading scores of grade-one children low in reading achievement who are taught by the usual classroom method which stresses the visual-auditory approach.

2. There is no significant interaction between intelligence and treatment.

3. There is no significant interaction between sex and treatment.

VI. PLAN OF THE STUDY

A pilot study was conducted to assess the suitability of the LMT for the use with grade one students. The results indicated that minor adjustments in teaching procedures and materials were needed in the administration of the test.

A standardized test, the Gates-MacGinitie Reading Test, was administered to the grade-one population of the Grande Prairie School District. These students had previously been administered a group mental-ability test, the Otis Quick-Scoring Mental Ability Test.

The lower 50 per cent of the grade-one students as identified by the vocabulary and comprehension test were classified as low-achievers in the reading for the purposes of this study. These low-achievers were then screened for hearing and vision difficulties. Students whose

hearing and vision abilities did not fall within the normal limits as tested by Eames Eye Test and an Tritone audiometer were excluded from the final test sample.

Each student in the treatment group was taught new words from the basal grade-one reader through his preferred modality by his regular classroom teacher during the grade-one daily reading period. New words were also taught to the control group using the teacher's customary classroom method. The time element was controlled so both groups would receive the same amount of teaching time. The treatment lasted for a period of six weeks. At the end of the treatment period the alternative form of the standardized vocabulary and comprehension test was administered to determine the gain in reading.

VII. STATISTICAL ANALYSIS

The data collected in the experiment were analyzed by computer programs of the University of Alberta, Division of Educational Research Services. A two-way analysis of variance with fixed factors, and t-tests were utilized in the treatment procedures.

VIII. LIMITATIONS OF THE STUDY

The following limitations are acknowledged:

1. Sample selection. The present study was delimited to the public-school grade-one population of a small urban center of northern Alberta. It is possible that the selection limited the socio-economic level of the sample.

2. Chronological age range. The entrance requirements for this school district limits entry into grade one to students who are six years of age by the last day of December in the year they wish to

enter school. Beginners are only allowed to enter school in September. Consequently, the chronological age span on the pupils in this study will be limited to a maximum of one year, that is, from five years eight months to six years eight months.

3. Visual-Kinesthetic, or Phonic-Kinesthetic Modalities of Learning. Some children may learn easier through a visual-kinesthetic or a phonic-kinesthetic sensory pathway. These children would not have been identified by the LMT and no provision was made in his study for their identification.

4. The Mill's Learning Methods Test. Identification of preferred modalities in children or of the difference children make in their use of specific modalities for learning is comples. Although the LMT did identify preferred modes of learning in a substantial percentage of the students involved in this study possibly an instrument with a higher degree of sophistication is required.

IX. NEED FOR THE STUDY

The ability to recognize words quickly and accurately is fundamental to success in reading. Only after a child has a certain degree of competency in word-recognition skills is he able to read.

As Dolch (1949, p. 142) suggests:

> We may say that the understanding of words in reading is basic, because without understanding of word meanings there can be no reading. Words are to reading metter what bricks are to a house. When you look at the house you do not think of the bricks, but without the bricks there would be no house.

This concept seems so obvious that for centuries, teachers of reading have been concerned with which method of teaching word recognition skills should be utilized. However, when teachers are faced with choosing a method of teaching word recognition skills to

beginning readers, they find themselves in a quandary. These basic methods have advocated: a visual approach, a phonic approach, a kinesthetic approach, or various combinations of the three. The teacher, then, is faced with the problem of choosing which method to use with her class, but each reading specialist appears to prefer a different method (Shubert, 1953, p. 266).

Unfortunately, then, there seems to be no clear cut agreement as to the best method of teaching word recognition skills to beginning readers. The solution to the teacher's quandary, however, may lie in a different approach to the problem. Rather than posing the question of what is the best method of teaching word recognition skills to this class, perhaps the question posed should be: What children among those I am to teach should be taught by what method? In other words, it is suggested that the teaching of word recognition skills should be based on the individual child's needs and abilities. As Wepman (1964, p. 225) suggests:

> The teaching of reading should be child-centered rather than method-centered; that is, the differences in children need to be understood to determine which methods might be most useful for a particular child or group of children.

Betts (1967, p.345) supports a child-centered approach in his discussion of modalities of learning when he states: "Children differ in the uses they are able to make of their mental processes for learning words."

This perceptual type theory suggests that a logical approach to teaching the reading program initially would be to group children according to their preferred mode of learning. Thus, children who learn best bisually could learn words through a program which initially stressed sight recognition, whereas, children who learn best auditorily could learn words through a program which emphasized a phonic approach,

A few children who learn best through tough or a kinesthetic means could learn words through a program which emphasized tracing.

This study has attempted to demonstrate the effectiveness of teaching to a child's preferred modality. Consequently, it is hoped that a contribution may have been made to the criteria upon which reading programs could be based initially and also, to the criteria upon which children could be grouped for reading instruction initially.

SUMMARY

Knowledge of the environment is obtained through some sensory modality, seeing, hearing, touching, tasting or smelling. It follows that in reading, the individual must become aware first that there is something to be read. Research has indicated that in reading, an individual may develop a preferred modality through which he can learn. Some individuals can learn initial word recognition skills more readily then, if they are taught by a visual method while some individuals can learn initial word recognition skills more readily if they are taught by a phonic method. Some children learn the skills more readily through a combination of methods while a few learn more readily through a kinesthetic method.

This being so, then, identifying the preferred modality of learning for a child is important for a teacher, especially those teachers of reading skills in the initial months of school. This study investigated whether the teaching of primary reading skills to a child through his preferred modality of learning would improve his word recognition skills. Consequently, low-achievers in reading after eight months of grade one were identified by the use of a standardized reading test. Visual and auditory screening devices were then used in

order to limit the test sample to those pupils whose hearing and vision were normal. The low-achievers were administered the LMT to identify their preferred modalities of learning. The test sample were randomly assigned to one of two special groups, a treatment group or a control group. The treatment group were taught new words for a period of six weeks in their regular reading program by methods which catered to their various preferred sensory modalities. The control group were taught for the same period by the teacher's usual classroom methods. At the conclusion of the treatment time, a second form of the standardized reading test was administered to provide a measure of gain experienced by both groups. The data obtained were processed by computer programs provided by the Educational Research Division of the University of Alberta. This study has postulated that different perceptual types among grade one students can be identified and has studied the effect of teaching initial word recogniton skills to the modalities of learning of these different perceptual types.

CHAPTER II

MODES OF LEARNING

I. INTRODUCTION

It is known that children are different from each other and from adults. Not only do they differ intellectually, physically, emotionally, and socially but research indicates that they also differ in the manner in which they perceive (DeHirsch, 1966; Fernald and Keller, 1921; Harris, 1964; Lowenfeld, 1945). In addition to children having characteristic modes of perceiving words it has also been postulated that children develop a preferred modality through which they learn (Lowenfeld, 1945).

Comprehension in reading may be considered as the comparing, contrasting, and combining of incoming sensory data obtained through the various modalities with existing knowledge leading to new behaviour or new conceptions. Russell (1956, p.117) explains concept formation thus: "Concepts develop out of related perceptual experiences..." They are "the means by which a child or adult represents anything to himself and thereby creates a readiness to respond with a particular type of behavious." He suggests that concept formation involves discrimination, plus a generalization or response to the common elements in an object or situation; then the integration of the percepts, memories, and images into a concept.

The incoming sensory data are obtained via visual, auditory, kinesthetic or a combination of these sensory pathways and arranged and stored in localized cell-assemblies in the brain by cerebral activity. The location of such centers in the brain has been often

demonstrated (Penfield and Roberts, 1966). Holmes (1957, pp. 49-68) describes the functions of these assemblies thus: (1) the function of one center is to store memory traces from visual impulses which arise when viewing a concrete object; (2) a function of the second visual centre is to store a symbolic representation of the ideas about concrete objects, relationships, or other ideational constructions; here, then, is where words are perceived, registered, categorized, and filed for future reference and recall; (3) a third center stores auditory impulses which carry information conveyed by spoken language; and finally, (4) a fourth center stores kinesthetic impressions from tactile and muscle sensations.

As a result of on-going cerebral activities during the act of perception in reading, the incoming sensory data are processed with previously stored information and the result is some degree of comprehension. That is, data obtained from the printed page via visual, auditory, and/or kinesthetic pathways are rearranged and combined with previous concepts, memories, images, already developed from past experience and some degree of understanding of what is read occurs.

It would follow that children in learning word recognition skills develop various strategies by which they try to identify unknown words. These strategies are not necessarily the same for each individual for it has been demonstrated that children differ in the degree to which they tend to use the visual, auditory and kinesthetic pathways through which they obtain incoming sensory information (Lowenfeld, 1945; MacAulay, 1965; Mills, 1956).

The development of this characteristic modality distinction appears to be influenced by perceptual processes, previous experiences,

purposes, maturation and the intellectual ability of the child.

This chapter will discuss perceptual styles, perceptual processes, and review selections from the literature related to these areas and discuss the implications of these matters to individual differences in modes of learning in the area of reading.

II. PERCEPTUAL STYLES

Researchers have suggested that one way of examining differences in the manner in which children learn is by looking at the different methods by which individual children attack the same learning task (Wepman, 1964). It has been hypothesized that children develop different perceptual styles, different mental processes by which they organize the sensory impulses which they receive from their environment (Holmes, 1957).

This section examines the research related to styles of perception, and follows this with a discussion of preferred modes of perception, and the manner in which individuals develop their particular mode.

Research Related to Word Perception

Research in reading has suggested that children differ in the way in which they perceive a word (Goins, 1958; Jenkinson, 1962). Although each child reacts to a "perceptual whole" there appears to be much variation in what this "perceptual whole" is. For some children, the perceptual whole is a word while for others it is a part of the word. It is not considered, that each child is stimulated holistically. What constitutes a "whole" varies from individual to individual; consequently, each child must be considered

a unique learner (Goins, 1958).

Research gives support for the hypothesis that individuals have characteristic modes of perceiving. Jenkinson (1962) drew attention to the work of German psychologists who hypothesized that perceivers might be classified according to temperamental set or attitude. It is suggested that some perceivers see the perceptual field as an integrated whole without too much regard for detail while others tend to concentrate on isolated or unrelated detail. The first perceivers are categorized as "analyzers" while the latter are "synthesizers."

The analyzers appear to be persons who concentrate on details and learn in this manner while the synthesizers concentrate on wholes or "Gestalts" and learn in this manner. Although these findings were in the field of vision, they have important implications for reading. For example, a study by Goins (1958, p. 102) with first-grade readers revealed that visual perception in reading is dependent to some extent upon the way in which the reader organizes in a cognitive style the symbols he sees. The first-grade pupils in her experiment used two distinct methods of attacking the same perceptual task. The superior reader seemed to have an "inherent strength of closure" that is required for success in reading. The poorer readers did not have this skill.. Although they perceived the word as a Gestalt, they did not have the ability to discriminate its component elements.

An earlier study by Petty (1939, p. 215) involved eidetic imagery and susceptibility to illusion tasks with low first-grade children. As a result of the study she inferred that the children who are "subjective" perceivers, ones who use a "synthetic" approach, should be introduced to reading by a method which stresses recognition

of words as Gestalts whereas the "objective" perceivers, ones who concentrate on details, should be taught by a phonic method.

Research, then indicates that individuals have characteristic perceptual styles and suggests that teaching methods take into account these individual differences. However, before a teacher can adjust her teaching method to fit a particular child's perceptual style, she should also be aware of a child's preferred mode of learning.

It has also been suggested that there are intro-individual differences between "synthesizers" and "analyzers" (Zaporozhets, 1965). For example, one child may learn about a new toy by a tactile exploration while another may rely on a visual examination to provide him with the same information. The first child has developed a working system which relies primarily on information obtained through a kinesthetic mode while the latter has developed a working system which relies primarily on visual data. Such children are identified as "haptics" and "visiles" respectively. At the same time one of these two could be an "analyzer" while the other is a "synthesizer." In other words, children may be categorized in two ways: firstly, by the manner in which they appear to organize the sensory data; that is, they are either "analyzers" or "synthesizers"; and, secondly, by the preferred modality through which they obtain their sensory data. Children who prefer to learn through their eyes have been classified as "visiles", children who prefer to learn through their ears have been classified as "audiles", and children who prefer to learn through their sense of touch have been classified as "haptics". Thus, a child may be an analyzer and at the same time a visile, or a synthesizer and at the same time an audile. The possible combinations are many.

Many investigators have been concerned with individual differences in modes of learning. Harris (1964, p. 19) in summarizing

some of the early works, cites investigations on imagery by Fechner, Galton, Binet and James. He reports that as early as k860, Fechner discovered marked differences in imagery among individuals. In the 1880's, Galton reported similar findings. By 1886, Binet was describing an "auditory type" and a "motor type," describing the auditory type as "conceiving all their recollections in the language of sounds: and the "motor type," on the other hand, as "remembering a drawing better when they have followed the outlines with their finger." James saw himself as a tactile learner.

Freud (1953) in his investigation on the causes of aphasia suggested that there are eye-minded people whom he designated "visiles" and ear-minded people whom he designated "audiles." Money (1962, p.27) in his discussion of a particular reading problem suggested that a person with a reading problem may be one who:

> Is in some manner a nonvisile cognitional type. He is perhaps a person weak in visual imagery and visual memory of all types, the opposite of the person with eidetic imagery and photographic memory.

Grey (1953) in his work with the electroencephalograph has noted the possibility of different sensory types. He discovered a visual type, a non-visual type and a mixed classification. Visual types used visual imagery extensively in their thinking processes while the non-visual types used little visual memory.

Several researchers have identified preferred modalities of learning among various age-groups. For example, Lowenfeld (1945) working in the area of art, suggested and presented evidence to support the contention that adults may have a preferred sense. He categorized people as "visiles," those people who perceive best visually, "audiles" those people who perceive best auditory and "haptics," those people who perceive best through touch or some kinesthetic means.

Holmes (1962, p. 77) after working with high school students concluded that individuals differ in the degree to which they tend to use auditory, visual, and kinesthetic sensory input channels. He found at this age level two-thirds of the students are predominantly visually-minded. The majority of the rest are auditorally-minded although a small fraction, mostly boys, rely heavily on a kinesthetic sense.

Mills (1956) who specifically investigated which modality of learning children used in recognizing words identified pupils who preferred to be taught by visual, phonic or kinesthetic means. His sample of fifty-eight children were drawn from first, second and third grades.

MacAulay (1965) also working with word recognition skills gave evidence to support the hypothesis that different children learn to recognize words more efficiently by certain methods of instruction at the first grade level.

If then, as the research suggests, pupils have a more efficient mode of learning which can be identified, this concept is important for educational practice. A teacher's effectiveness is related to whether or not she knows enough about a child so that she can adapt her method of instruction to the needs of that specific child. Knowing a pupil should include knowing his preferred mode of learning.

Development of Preferred Modes of Learning

Although there is much evidence to support the existence of individual perceptual styles, there is a paucity of studies in the area as to how an individual develops a preferred style.

Birch (1962, p. 164) hypothesizes that the reason some individuals

differ in their preferred mode of perceiving is that there exists a hierarchical organization of sensory systems. He suggests "the developing child goes through a number of sequences in the course of which alterations in the nature of the hierarchical structuring of avenues of sense occur." The infant responds primarily to interoceptive and visceral stimuli received through auditory and visual input systems. As a corollary to this hypothesis, Birch suggests that reading disability "may stem from the inadequate development of appropriate hierarchical organization of sensory systems and so, at least in part, be the product of the visual system hierarchical dominance."

In other words, a child fails to develop sufficient ability to combine sensory data from the other modalities when reading, necessitating his reliance on visual information only. Consequently, he rarely uses auditory cues or kinesthetic cues to aid him in the identification of an unknown word. Such a child could be categorized as a visile.

Vernon (1954, p. 225) after reviewing the research in this area suggests that individuals develop characteristic modes of perceiving as a result of a number of factors including maturity. She states, "different modes of perceiving may be partly a function of maturity, partly of social and educational background." As a result of her own investigations she would also include the type of material presented and the method of presentation. She summarizes her findings by suggesting that:

> The individual carries with him into every perceptual situation ...his characteristic sensory abilities, interest and temperamental qualities. Insofar as he may specifically relate any of these to the total perceptual situation his responses will be coloured and to some extent determined by these inherent individual qualities. Thus, his response may vary not only according to the nature of the qualities possessed but also to the degree which they become involved in the perceptual situation.

Summary

There is, then, evidence to suggest that characteristic styles of perceiving exist among individuals. It has also been suggested that the perceptual style may change in children according to their age and background.

Children, then, may differ in the manner in which they perceive. This difference is a result of many factors including their stages of physical and cognitive development, and their previous experiences. Thus, it is postulated that there appears to be at least two types of perceivers, the "synthesizers" and the "analyzers." In addition, it is suggested that some individuals develop a preferred sensory mode. That is, some people are classified as "audiles", some are "visiles," and some are "haptics."

If children have a preferred mode of learning then this is important for educational practice. It would seem logical that initial grouping and instructional methods used in teaching primary reading skills could identify and take into account these individual differences among pupils.

III. PERCEPTUAL PROCESSES

Perception is a very complex process consisting of visual, auditory, kinesthetic, and other elements. If the integration of these elements does not occur or if one of these elements is inefficient, then there may be a lag in the development of the necessary perceptual abilities an individual requires in order to read.

This may result in a child adopting a particular modality through which he prefers to learn.

This section opens by noting the perceptual processes as they are related to the development of preferred modalities of learning and

then reviews selected studies related to visual perception, and auditory perception as they affect the development of an individual's characteristic style of learning. The section concludes by discussing briefly the language development and the mental set of the individual as they are related to the perceptual processes, and consequently the development of an individual's preferred mode of learning.

Perception and Perceptual Styles

Jenkinson (1962, p. 196) has defined the perceptual process thus:

> the process of organizing and interpreting the sensations the organism receives through the five senses, from external and internal stimuli. Interpretation of the sensations will depend upon an individual's ability to be aware of his reaction to the stimulus, to classify this on the basis of likenesses and differences of previous conceptions, and to categorize his reaction by naming, and relating this to the total structure of his world.

This concept of perception as an integrating process is also supported by Hebb (1958, p. 48) who has defined perception as a setting up or modification of "mediating processes" in preparation for an adequate response.

Vernon (1931, p. 103) after reviewing the research, feels that perception consists of the following six stages:

(1) Perception of gradually increasing specificity, as the salient parts rise clearly out of the background;

(2) kinesthetic and organic sensation, either general or localized, or both;

(3) imagery, predominantly visual, but sometimes also kinesthetic or auditory-kinesthetic;

(4) associated imageless thought;

(5) feeling of familiarity, ease of apprehension, affective tone;

(6) attribution of meaning and complete assimilation;

Perception, then, involves the individual becoming aware of his environment and interacting with it. However, perception goes beyond mere sensation. Input sensory systems, the visual, aural, and tactile, provide sensory data for the mediating systems such as the central processes concerned with the organizing of information from the corresponding receptive areas of the brain. One part of the brain stores data from visual stimuli, another part stores symbolic representation of the ideas about objects, relationships and other systems of organization; a third area stores auditory data from tactile and muscle sensations (Holmes, 1962). The presence of such areas has been demonstrated by Penfield (1966). As the sensory data is received by the individual, he attempts to relate this to some previous stimuli or experience then they are accepted, and the individual responds in some manner; however, if the data are foreign to the individual's repertoire or previous experience then some modification through cerebral activity will occur within the perceptual organization of the individual prior to the response. Finally, as a result of integrating cerebral activities some response such as speaking, reading, or writing occurs through the output systems.

It follows then, that individual differences among learners depend, to some extent, on the sum total and the essence of their previous experiences, and upon the efficiency and depth of their perceptual organizing abilities.

Wepman (1962, p. 180) suggests that the development of the mind's ability to handle perceptual tasks is a function of maturity. He believes that initially the central nervous system operates as a reflex organism only capable of transmitting stimuli along predetermined routes to stipulated motor expression. Progressive

development occurs to allow perceptual functions to ensue. Once this development has occurred:

> Signals are carried along specific input modalities, decoded, recognized, comprehended, retained in memory, associated with previously received stimuli and sensory images. In other words, they go through a process of intergration before they become motor patterns along specific output modalities.

Some support is given to Wepman's contention that perceptual activity is a funtion of maturity by Birch (1962, p. 163) who hypothesizes that the phenomena of perception can be divided into three conceptual levels: (1) an early level of perceptual discrimination; demonstrated by the ability of young children to recognize and discriminate between identities and nonidentities; (2) a "perceptual analysis" level which consists of the capacity of the individual to isolate the units of which a Gestalt is composed; and (3) a "perceptual synthesis level" which consists of the capacity of the individual to discriminate between whole figures.

In other words, Birch postulates that the young child first develops the ability to distinguish "figure" from "ground"; therefore, developing the ability to recognize objects. The second stage of development involves the child having the ability to recognize details within a particular object, that is, a house is composed of a door, windows, a roof, and so on; and, finally the child develops the ability to group together various characteristics to construct a whole; that is, arms, legs, a head, make a man. In reading, then, it may be hypothesized, the child first develops the ability to recognize the individual letters or group of letters within a word; and finally, the ability to group letters to make words.

In summary, in the reaction of an individual to exteroceptive or propriocetive stimuli, a perceptual process mediates between the

stimuli and the responses and organizes the incoming sensory excitations into a pattern which eventually results in some response. These patterns vary from individual to individual for new stimuli are assimilated and organized according to the individual's repertoire of previous experiences and stage of perceptual maturity. In the reading process, the graphic symbols act as the stimulus. The response is some degree of comprehension

Visual Perception and Perceptual Styles

The perception process is greatly influenced by the physical ability of the eyes to see. Since this ability varies from individual to individual, it can affect the development of a characteristic mode of learning

Eames (1953, p. 138) describes reading as a psycho-physical process involving visual stimulation, followed by transmission of neural impulses to the brain. The neural impulses trigger cerebral acts which result in the perception of the words as objects and as symbols. He considers the perception of a word more difficult than that of an object for it involves the skill of symbolization. That is, an individual must first become aware that he is looking at an object which is a word before he can attach its symbolic meaning to it.

The neural impulses involved in reading, which arise in the retina when a word is seen, arrive at the visual area in the back part of the brain via the optic nerves. Eames (1953, p. 138) following the work of Brodman and Penfield (1966) suggests that this occurs in the following manner:

> The impulse first enters the visuo-sensory area of the occipital lobe (Brodman:17) which is connected with seeing without recognition thence it moves on to the visuo-psychic areas (Brodman:18-19) concerned with visual organization and association. Area 18

> permits recognition of a rather simple nature, while area 19 has to do with a more complex kind of recognition but mainly with visual memory. If the object observed is a word or a group of words they are seen but not recognized as such in area 17. They are recognized as word forms in areas 18 and 19, but their meaning is not comprehended until the angular gyrus of the inferior pariental lobe is reached (area 39). This part of the brain has to do with the interpretation of symbols (letters, words, syllables) and combines the functions of recognition and visual memory for word form.

A symbol, be it a letter or a cluster of letters, reflects light waves to the retina of the eye, the receptor organ. In addition to the strength of the light waves, the quality of the retinal stimulation is affected by the physical characteristics of the eye and its related muscles; that is, a person "sees" only as well as his eyes allow him. The visual aptitudes involved are: visual acuity, or the ability of the eyes to work together as a team; and, accomodation, or the ability of the eyes to focus. Any physiological impairment which affects these skills can be a contributing factor to the inadequate perception of the symbol.

It appears, then, that the visual perception of a word involves the physical capabilities of the eyes and many of the higher mental processes associated with intelligence and previous experience. As these would vary from individual to individual the findings would also imply that children entering first grade would have developed the use of this sensory-mode with differing degrees of success.

Auditory Perception and Perceptual Styles

Children not only differ in the manner in which they see words but also in the manner in which they hear words. The ability to retain an auditory image will be affected by the development of the necessary auditory skills and the use by children of an auditory mode of learning would depend upon the development of the necessary auditory perceptual

skills.

Auditory perception has been defined as "the mental awareness of sounds" (Betts, 1967). Wepman (1960, pp. 325-331) has suggested that there is a sequence of development involved in such an awareness. The first step is the reception of the sound by the nervous system or acuity; the second step is comprehension or the extraction from the auditory stimulus of its relative meaning; and, finally the third step is that of discrimination and retention. In this final step the individual is required to make subtle distinctions between individual sounds and hold each sound long enough in mind to make phonic comparisons.

It would follow, then, that although a child may have no physical impairment with his hearing he could still lack the necessary perceptual abilities of understanding or discriminating between the sounds he hears.

The importance of adequate auditory perceptual abilities to beginning readers is outlined by Vernon (1957, p. 167) who discusses a series of aural cognitive factors which she feels contributes to reading disabilities. Among these are faulty aural perception of word sounds, and short aural memory span. Additional evidence to suggest that the aural factor is a crucial factor to progress in word attack and word recognition skills is provided by Dykstra (1966) and Coffrey (1955).

In summary, auditory stimuli cause a response in the brain via the nerve endings in the ear. The degree to which these stimuli are heard is affected by the efficiency of the individual's auditory acuity. Once a sound is heard, a process of discrimination occurs in which the individual sorts out and distinguishes differences between stimuli. In addition, the review of the literature suggests that a

dysfunction in auditory discrimination is significantly related to reading disabilities among beginners. Consequently, it would seem that for some beginners in reading, a teaching method which emphasized a phonic approach would be unsuitable. However, for children who have developed a more efficient auditory mode of learning, a phonic approach would seem most suitable.

Inter-Modality Transfer

The image that children create from a particular stimulus will be influenced to a large degree by the degree to which they can integrate the auditory-visual stimuli.

In order to read a transfer across modalities is necessary. As Wepman (1964, p. 25) states,

> A child who sees the printed word "dog" must evoke not only previous visual stimuli of printed forms but life forms as well; he must shift from the visual input to previously received and stored auditory patterns calling up the word "dog" and perhaps to the sensations of petting a dog, of his small and even his frisky movements, before the printed word has full meaning for him. Without this shift to other modal learning, little integrative meaning may be attached to the printed word.

This means, that, visual cues, in reading words are supplemented by what the child has obtained through auditory and kinesthetic processes. That is, many of the letters or words which the beginning reader encounters may have been heard by him prior to his seeing them as graphic symbols. If he can relate a printed word to his experiences with a familiar spoken word, then he can often understand the printed word.

This view of the reading process, then, presupposes that children have developed auditory perception skills prior to learning to read of sufficient depth to enable them to apprehend the spoken language. In addition, it presupposes that an integrative organization

between the visual and auditory system has developed, an organization which appears to be necessary for the acquisition of reading.

A recent study by Birch and Belmont (1965, p. 313) relating auditory-visual integration, intelligence, and reading ability among young children found that this integrative function improves with age. The most rapid development occurs between the age of five and seven in bright normal middle-class children. Furthermore, their results suggest that the acquisition of auditory-visual integration may be viewed as "learning to learn to read and may well represent a primary competence requisite to the acquisition of this skill." It was also found that in reading in the early grades, competency appears "to be more related to the auditory-visual integrative function per se than to intelligence." These findings are supported by a study by Beery (1967, p.852) who found that the ability of dyslexic children to make comparisons between auditory and visual stimuli was significantly inferior to that of the average readers.

Muehl and Kremenak (1966, p.230) suggest that the beginning reader must make a particular auditory and visual sensory integration; the spatially ordered visual pattern of the graphic symbols to the temporally ordered patterns in speech. In other words, to actually read the reader responds to the printed visual pattern with appropriate sound sequences. It follows, then, the beginning reader needs to be able to integrate information received from visual and auditory stimuli. However, since he can speak a language it is assumed he can discriminate to some degree between auditory stimuli, and since he can identify objects it is assumed he can discriminate to some degree between visual stimuli. The beginning reader has no doubt developed a visual-to-auditory integration skill, and an auditory-to-visual

integration skill since he can name objects if asked or point to them if they are named; but are these skills carried over to the process of reading? The results of the Muell and Kremenak study indicate that they are, and that a child's ability to match visual-to-auditory and auditory-to-visual stimuli make significant contributions to predicting reading success.

In summary, it has been suggested that in order for a child to learn to recognize words visually, it is necessary for him to develop a cognitive auditory-visual integrative skill. The findings also imply that the development of this necessary skill varies from individual to individual.

Kinesthetic Perception and Modes of Learning

Most reading authorities agree that visual perceptual abilities and auditory perceptual abilities must be developed to some degree in order for a child to perceive graphic symbols (Betts, 1967; Buswell, 1922; Dechant, 1964; Gray, 1952). In addition, some authorities suggest that the development of a certain degree of kinesthetic perception ability is also desirable, that is, since many of a child's earliest associations with words are largely muscular in nature, a kinesthetic sense can be used in word recognition. Fernald and Kellar (1921, p.335) summarize this theory:

> Lip and hand kinesthetic elements seem to be the essential link between the visual cue and the various associations which give it word meaning. In other words, it seems necessary for a child to develop a certain kinesthetic background before he can apperceive the visual sensations for which the printed word forms the stimulus. Even the associations between the spoken and the printed word seem not to be fixed without the kinesthetic link.

Zaporozhets (1965) reports work done by Russian psychologists

in connection with the relationship between visual and tactual perception of forms which lends support to Fernald's theory. Part two of their experiment involved children being required to identify visually a form they had previously examined tactually. The improvement that occurred in recognition seemed to be directly related to the number of actual movements made during the tactile examination.

Thus, it appears that kinesthetic perceptual skills can supplement visual and auditory cues for the child in the perception of a graphic symbol, and for certain children a beginning approach to reading which emphasized kinesthetic movements while learning words would be desirable.

Language Development and Perception

To many researchers, reading, the visual act, is dependent upon the child's previous auditory learning. Buswell (1922, p. 47) suggests "the reading process is basically a kind of perceptual learning in which visual symbols are perceived and related to already known auditory symbols of spoken language." More recently, Carroll (1964, p.181) says "the behavior we call reading may be described as the perception and comprehension of written messages." Goodman (1966, p. 188) believes that the process of reading comprehension differs from the process of listening comprehension only in the manner in which the sensory excitations are received. Listening depends upon aural input whereas reading depends upon visual input. He further suggests that in a proficient reader oral and written language have become equivalent and parallel systems.

Although both Carroll and Goodman go far beyond this in their descriptions of the processes involved in reading, they agree the basic

step is the decoding of the printed visual orthographic symbol into the spoken sound which it designates; it can be thought of as the translation of graphic symbols into oral language. Language is spoken sound; writing is a visual symbolization of sound although there is not a one-to-one relationship. Thus, in learning to read, if one accepts this viewpoint, the child must develop some ability in making a [illegible] correspondence between the elements of the spoken language and the written symbol. This, to many, becomes a fundamental process of the reading act, and presupposes that the child has developed the necessary perceptual abilities for the correspondence to occur.

It also follows that since children develop language skills with varying degrees of success, individuals have a different repertoire of language experiences upon which to draw during the act of perception. Perception, then becomes a very personal thing. This means, that perception is influenced to a large degree by the individual's perceptual style.

Besides these necessary perceptual and cognitive skills discussed above, Taylor (1964, p. 193) emphasizes the importance of the mental set of the individual. He states:

> It is obvious that the degree of involvement on the part of the student is a vital factor in word perception. The factors that can contribute to attention are the general physical (especially visual) and mental well being of the individual, the learned ability to concentrate and focus attention and the acquired ability to become involved and maintain interest.

Vernon (1954, p. 225) in agreeing with this point of view emphasizes that the dgree of attention that the reader pays to the task varies greatly from time to time, and with it the amount he perceives. If, as often occurs, the reader is not concentrating but thinking of something else, then very little is perceived.

Summary

It has been suggested that reading can be considered a perceptual process, a psycho-physical process and a psycholinguistic process. In the identification of a word certain sensory modalities, a cognitive organizing and integrating ability, and a particular mental set appeared to contribute. When stimulation of the retina occurs, the visual processes become involved. To aid in identification of the word usually auditory cues and sometimes kinesthetic cues can be utilized. While the physical acts are occurring the attention of the reader, his language and experiential background, and the cognitive processes by which he actually organizes and integrates his reaction to the visual stimuli are of major importance for an accurate perception.

IV. IMPLICATIONS

That some children learn best through an auditory method, some through a visual method, and some through a kinesthetic method has been suspected by researchers for a long time. The implications of these findings for the teaching of initial words in reading would seem apparent. Since children differ in the way in which they perceive graphic symbols and have preferred modalities through which they learn, it may be that different methods of teaching sight-words could be utilized to capitalize on the preferred modality to assist beginners in adapting to the learning situation.

Some evidence to support this concept is found in a recent study by LeHirsch, Jansky and Langford (1966, p. 81) who theorized that many children would not be reading disability cases if their difficulties had been recognized prior to their entry into the first grade. Consequently, they attempted to identify a specific pattern of dysfunctions which would be useful in predicting reading, writing,

and spelling disorders. Although their prime interest was in development of a predictive instrument for success in these skills, their testing instruments isolated ten subjects (N=106) who demonstrated a bizarre modality patterning. Of this group, three were identified as having superior visual perceptual abilities but limited auditory skills. Despite their auditory deficiencies, these three children became good readers and spellers. Since the usual teaching approach utilized with these children emphasized a visual approach and as these children have a superior visual competence, these results were predictable. Reading is primarily a visual perceptual task. However, the seven others in the group had different results. These seven indicated a superior competence on the four auditory perceptual performance tests administered and striking deficits on the four visual perceptual tests. Of these seven, the five who were exposed to "heavy doses" of phonics did well in reading while the two who received no special treatment failed all reading tests at the end of the second grade.

A study by Mills (1956, p. 221) was concerned with determining the teaching method or combination of methods most effective in teaching sight words to various types of individuals. He found "that different children learn to recognize words more efficiently by different teaching methods." His teaching methods were based on isolating a child's most efficient method of learning; phonic, visual, or kinesthetic, and then capitalizing on this preferred modality by teaching sight words through this modality.

A recent study by MacAulay (1965) attempted to identify children who have a preferred mode of learning. MacAuley's main testing instrument was the LMT. Her study attempted to determine

which of four methods, visual, auditory, kinesthetic or a combination was most effective for first grade entrants in learning to recognize words. Her experimental group consisted of eighty-two first-grade entrants. These children were tested individually with the LMT to determine their most effective mode of perceptualization. As a result of a statistical treatment between the results of aptitude tests designed to measure similar sensory modes of learning as the LMT, MacAulay concluded, "there is a positive relationship between learning to recognize words by any one method of the LMT and performance on tests designed to measure the same sensory mode of learning.

V. GENERAL SUMMARY

This chapter has discussed the concept of perceptual styles among individuals and postulated that such styles develop as a result of maturity, previous experiences, and the intellectual development of the child. Selected studies regarding the perceptual processess and abilities as they are related to individual modes of learning have also been reviewed.

Since the research indicates that children differ in their levels of development in the various perceptual abilities and further that some pupils have developed a preferred modality through which they learn, at first-grade entrance, it has been suggested that teaching methods could be adapted to better meet the needs of the individual child.

This means, that for a child who has been identified as a visile, a method of teaching word recognition skills which relies almost exclusively on the eye as the sensory pathway through which to present data may be the most effective. Similarly for an audile a

teaching method for word recognition, which stresses the auditory elements within words may be preferable.

The research findings then stress the need for identifying an individual's preferred modality of learning and then the planning of an instructional program which would cater to this preferred modality.

CHAPTER III

EXPERIMENTAL DESIGN OF THE STUDY

This chapter will describe the pilot study, the test sample, the testing instruments and their use, and the statistical treatment of the data obtained.

Basically, the design consisted of a pretest, posttest and control group (Campbell and Stanley, 1964, p. 13).

I. THE PILOT STUDY

A pilot study was conducted in Edmonton, an urban centre of one-half a million people in western Canada in March, 1968, to test the efficiency of the major testing instrument of the investigation, the LMT. In particular, it was considered important to examine the suitability of the testing procedures and the time allotments of the teaching-testing periods. Five children (three boys and two girls) participated in this preliminary study. The five children had been selected by their classroom teacher as pupils who were having difficulty in reading. They were, in fact, her low reading group. Their intelligent quotients ranged from 68 to 104 as measured by a group mental ability test, The Detroit First Grade Beginners' Intelligence Test and their chronological ages ranged from six years and three months to six years and nine months.

These five students were administered the LMT by the investigator. Of the five students participating in the preliminary study, two were identified by this test as "audiles" and one was identified as a "haptic." None were identified "eclectics" or "visiles." The other two students were not identified by the LMT as having a preferred mode

of learning. These two students represented 40 per cent of the small pilot study sample and alerted the researcher to the possible situation that either a substantial per cent of children do not have a preferred mode of learning (and therefore they have no problem - or do they?) or the LMT is not adequate in identifying it (and this could be a stumbling block). If children do not have a preferred mode of learning established so a test can identify it, it may be a source of trouble to them in school learning in the same way that lack of an established sense of direction or of laterality may confuse the child.

Since the pilot study showed that the LMT did identify preferred modalities of learning in grade one children according to criteria established by Mills, it was decided to adopt this test as the primary research instrument of the investigation. As a result of this preliminary study, minor adjustments were found to be necessary in the testing procedures as outlined by the manual of directions of LMT. These adjustments will be reported in detail in the description of the test instruments.

Since the purpose of the pilot study was to test the efficiency of the LMT, no treatment, teaching and further testing was given to the students in the pilot study who were identified as having preferred modes of learning.

II. THE TEST SAMPLE

All grade one students of the public school system of the city of Grande Prairie participated in the study. Grande Prairie is a city of twelve thousand population, three hundred miles north-west of Edmonton, Alberta. In order to identify the poor reading-achievers of this population of 231 students, the Gates MacGinitie Reading Test,

Primary A, Form 1 (See Appendix B), was administered.

The primary A level of the Gates MacGinitie Reading Test consists of two parts: vocabulary and comprehension. The total possible score on the two parts of the test is eighty-two. The range of marks was from eight to eighty-two. The mean score was 49.7 and the median 49.5. As a result it was decided that students who socred less than fifty on the screening test were to be classified as poor achievers in reading. One hundred eighteen children were in this category (sixty-nine boys and forty-nine girls).

After visual and auditory screening procedures had been conducted, the LMT administered, and adjustments made for absences, the final test sample of the grade-one population was composed of sixty children (thirty-three boys and twenty-seven girls). To comply with the design of the study, these sixty were randomly assigned to a control group or a treatment group. The means of these two groups of low-achievers on the two forms of the Gates MacGinitie Reading Test differed by 1.76 with the non-treatment or control group having the higher mean. This initial difference was adjusted by statistical procedures during the treatment of the data. In addition, the mean of the students involved in the experiment was lower by 11.31 from the mean of the total grade-one population who took the survey test. This is an indication that these students involved in the treatment and non-treatment groups were in fact the low-achievers in this grade-one population.

Visual and auditory screening procedures, utilizing the Eames Eye Test and the Tritone audiometer were administered to the 118 students to limit the test sample to those children whose hearing and vision fell within the normal range. As a result of the visual and

auditory screening ninety-two children (fifty-two boys and forty girls) were suitable for administration of LMT.

Of the twenty-six students who were eliminated from the group, twenty were screened out as a result of visual difficulties (twelve boys and eight girls) and six as a result of hearing difficulties (five boys and one girl). It is interesting to note that 22 per cent of the low-achievers in this grade-one population had auditory or visual difficulties. This suggests that there is a real need for earlier identification of these problems in school beginners. It should also be noted that twice as many boys as girls were eliminated by the screening procedures.

Intelligence quotients of the fifty-two boys and forty girls were measured by the Otis Quick-Scoring Mental Ability Test, Alpha Form A, which had been administered in April, 1968, to the total grade-one population of the district by the regular classroom teachers. The intelligence quotients of the group ranged from 90 to 120 with a mean intelligence quotient of 108.

All participants in the study were classified into low, average, and high according to their scores on the Otis Quick-Scoring Mental Ability Test to determine if the teaching of primary word recognition skills to the preferred modalities of poorer readers was influenced by intelligence. For the purpose of this study it was decided to classify students with intelligence quotients of 100 to 115 as average, and those with scores over 115 as high. With this classification, approximately 20 per cent of the students were low in intelligence, 60 per cent were average, and 20 per cent were high.

The ninety-two students identified as low achievers in reading were administered the LMT by the remedial reading teachers, the

principals of the schools participating in the study, and the investigator. The participating teachers and principals were trained in the administration of the LMT by the investigator. The training sessions consisted of a lecture, demonstrations, and practice sessions. Table I compares the years of training and experience of the personnel involved in the administration of the LMT. Four of the eight test administrators had university degrees while one had a minimal amount of teacher training. Four were directly involved in the administration of elementary schools while the remaining four were directly involved in the remedial reading program of the district. The majority of the test administrators had limited formal training in the teaching of reading although all had at least one university course in the field. Most of these courses had been taken during their initial teaching several years ago.

In addition, the testing program was supervised by the investigator to ensure more uniform testing procedures.

The LMT identified twenty-eight (seventeen boys, eleven girls) of the ninety-two pupils as visiles, sixteen (nine boys, seven girls) as audiles, six (four boys, two girls) as haptics, and ten (three boys and seven girls) as eclectics. In a study of a similar nature with older students corresponding findings have been made; that is, the largest percentage of the pupils were visiles, a lesser percentage, audiles and a small percentage, haptics (Holmes, 1962). Twenty-eight were not clearly identified by the LMT as having a preferred mode through which they learned and consequently, were eliminated from the study. Four pupils were absent during the administration of the LMT.

An informal analysis of scores of the twenty-eight students who were not identified as having preferred modalities of learning by the

TABLE I

TRAINING AND EXPERIENCE OF PERSONNEL INVOLVED IN THE ADMINISTRATION OF THE LMT

Person	Position	University Training in years	Experience (in years)	No. of Reading Courses	Year of Last Reading Course
A.	Principal	4	25	2	1954
B.	Remedial Reading Teacher	2.2	7	1	1953
C.	Principal	5	7	2	1958
D.	Principal	4.5	10	2	1954
E.	Remedial Reading Teacher	1.8	6	2	1952
F.	Remedial Reading Teacher	1	8	1	1959
G.	Remedial Reading Teacher	2	37	1	1940
H.	Assistant Superintendent	5	12	4	1968

LMT revealed that three of these had perfect scors on all four of the sub-tests regardless of the method of presentation of the words although they had been identified as low-achievers by the Gates MacGinitie Reading Test. Four of the group of twenty-eight had perfect scores on three of the sub-tests while twelve had equally scored high on at least two of the sub-tests. Eight of the twenty-eight students had their lowest scores of the sub-test for the kinesthetic method of presentation. These findings suggest that either some children can adapt equally well to various methods of presentation and do not have a preferred modality of learning readily identifiable by the LMT or that they do not have an established preferred mode.

Although the LMT did identify 68 per cent of the low-achiever population as having more efficient modes of learning, the question arises of whether or not this instrument is sophisticated enough to give a sufficiently discriminating measure of modalities of learning, if in fact, children at the age and grade level do have readily identifiable preferred modes. The final test sample, then, consisted of sixty students (thirty-three boys and twenty-seven girls). Table II shows the distribution of the test population by preferred modes of learning. Table III shows the distribution of the students in the test sample by intelligence, sex and by preferred modes of learning.

The test sample of sixty students was allocated into two groups by the use of a table of random numbers. The treatment group were taught new words in the reading program by methods which relied primarily on teaching procedures which catered to their preferred modalities of learning for a period of six weeks. The four methods used were visual, phonic, kinesthetic, and a combination of the previous three. In the visual method, new words were taught to the pupils by

TABLE II

DISTRIBUTION BY PREFERRED MODES OF LEARNING OF THE TEST SAMPLE OF STUDENTS

MODES OF LEARNING		STUDENTS IN TEST SAMPLE		
		Boys	Girls	Totals
	Number	33	27	60
	Per cent	55	45	100
1. Visiles:	Number	17	11	28
	Per cent	28	18	46
2. Audiles:	Number	9	7	16
	Per cent	15	11	26
3. Haptics:	Number	4	2	6
	Per cent	6	3	10
4. Eclectics:	Number	3	7	10
	Per cent	5	11	16

TABLE III

DISTRIBUTION BY INTELLIGENCE, SEX AND PREFERRED MODES OF LEARNING OF THE TEST SAMPLE OF STUDENTS

INTELLIGENCE	RANGE OF INTELLIGENCE QUOTIENTS	PREFERRED MODE OF LEARNING	NUMBER OF STUDENTS IN TEST SAMPLE					
			Treatment group (N=30)			Control Group(N=30)		
			Boys	Girls	Total	Boys	Girls	Total
OTIS QUICK-SCORING MENTAL ABILITY TEST	100 -	Visiles	2	3	5	1	2	3
		Audiles	2	0	2	0	0	0
		Haptics	1	1	2	0	0	0
		Eclectics	0	0	0	1	0	1
		Total	5	4	9	2	2	4
	101 - 115	Visiles	6	1	7	4	3	7
		Audiles	3	2	5	2	5	7
		Haptics	1	0	1	1	1	2
		Eclectics	0	4	4	1	2	3
		Total	10	7	17	8	11	19
	115 +	Visiles	1	1	2	3	1	4
		Audiles	1	0	1	1	0	1
		Haptics	0	0	0	1	0	1
		Eclectics	1	0	1	1	0	1
		Total	3	1	4	5	2	7
	Totals	Visiles	9	5	14	8	6	14
		Audiles	6	2	8	3	5	8
		Haptics	2	1	3	2	1	3
		Eclectics	1	4	5	2	3	5
		Total	18	12	30	15	15	30

the stressing of the visual characteristics of the word by such techniques as examining the words for their relative length and drawing outlines.

The phonic method stressed such qualities as initial and ending sounds, rhyming elements, and familiar sounds in the words being studied.

Crayons and large manuscript printing were used in the kinesthetic method. New words were printed in large manuscript letters on two by four inch cards. The pupil traced these letters with his finger and then practiced tracing them by himself.

The combination method was an eclectic approach in which new words were taught by giving equal emphasis to the visual characteristics, sound qualities, and kinesthetic qualities of the new words.

The control group were taught new words by the teachers' usual classroom methods for the same six weeks' period.

The usual grade one methods utilized in the school district rely primarily on the teaching methods outlined in teaching manuals of The Ginn Basic Readers (1957). Each lesson plan in these manuals include a section on word study skills. The program can be described as an eclectic one for it provides opportunities for the child to learn word recognition skills through such a variety of methods as the use of picture clues, recognition through general configuration or the usual characterisitics of words, common elements of words, use of phonetic analysis, use of context clues, and use of structural analysis. In addition to the basal readers, some emphasis is also placed on phonics instruction through the use of selected excercises from various workbooks. The Curriculum Foundation Series (1959) is also available to the teachers for supplementary and extension purposes.

In general, the teaching procedures as outlined in the guidebooks of the basal reading series are followed by the teachers of the district; however, these techniques vary from classroom to classroom depending upon the skill, training and experience of the individual teachers. Little emphasis is given to kinesthetic methods in the school district.

The grade one teachers were instructed in the methods to use with the treatment group. Each procedure was outlined and the teachers were cautioned not to deviate from the prescribed teaching method for the duration of the study. In addition, the time element was controlled in order that the students in the treatment group were not given extra teaching time. Supervision of the experiment was conducted by the investigator and the Assistant Superintendent of Schools.

The teaching methods used were those as outlined by the LMT. Each method was explained to the teachers involved in the experiment following demonstration classes and in-service training sessions. Discussions were held during the program regarding the teaching methods used. The investigator visited some classes during the six-week experimental period to observe the manner in which the classes were conducted and where possible ensured that the methods suggested were used.

At the end of the six-week treatment period the Gates MacGinitie Reading Test, Primary A, Form 2 (See Appendix C) was administered to both groups to determine whether there was a significant difference between the mean-gain reading scores. The second form could only be administered to fifty-seven since two were absent, and one had been transferred out of the school district. Of the three who were lost from the study, two were from the treatment group and one from the control group.

Table IV compares the years of training and experience of the teachers involved in the study. The training and experience of the teachers was varied. While two had university degrees, three had the minimum legal training required for teaching authority in Alberta. Two of the teachers had over ten years experience in teaching at the grade-one level while one was a beginning teacher. Although all had some formal training in the teaching of reading, this training was limited and in one instance was taken ten years ago. A recent study by Tetley (1964) showed that the recency of the last reading course was the critical characteristic of teachers who taught reading better.

III. THE TEST INSTRUMENTS

The tests described in this section were used to measure intelligence, reading vocabulary, and comprehension skills, and to determine the preferred modalities of learning. Screening tests used to discover auditory and visual defects are also described.

Intelligence Test

Otis Quick-Scoring Mental Ability Test: Alpha Test (Form A)

The Alpha Test is designed for grades one to four. Since it has been found difficult for beginning first grade students, its use is not recommended by the manufacturers until the beginning of the second half of the first grade. Consequently, this test is not administered in the Grande Prairie School District until the latter half of April. The test is administered as a group test by the regular grade one teachers as a part of the general testing program of the district. Since this test had been given, the results were used in May by the investigator as a general measure of intelligence of the

TABLE IV

A COMPARISON OF YEARS OF TRAINING AND EXPERIENCE OF TEACHERS INVOLVED IN THE TEACHING OF VARIOUS METHODS

Teacher	Training (in years)	Experience (in years)	Experience Teaching Grade I	No. of Reading Courses	Year of Last Reading Course
A.	1	5	2	1	1962
B.	2.4	8	4	2	1959
C.	1	6	5	1	1960
D.	2	2	2	2	1965
E.	4.5	26	20	4	1961
F.	2	4	2	2	1963
G.	1.8	9	7	1	1964
H.	4	3	1	2	1964
I.	2.2	6	4	2	1961
J.	1.2	13	10	1	1958
Mean	2.21	8.2	5.7	1.8	

test sample.

The special feature of the test is that it consists entirely of pictures; consequently, the sub-tests do not require reading ability. There are ninety groups of picture and designs made up of four parts to each unit. Two tests are given; one a nonverbal and the other, a verbal. One set of directions requires the children to mark a picture in each row which is different from the others in the row, while the other set of directions calls for the marking of a different picture ineach row in accordance with specific directions.

According to the test manual the reliability co-efficients of the Non-verbal and Verbal tests are .68 and .71 respectively. The reliability of the total score (Non-verbal plus Verbal) is .81. These co-efficients indicate the two sub-tests are about equal reliability, but when combined a total score is obtained that is more reliable than either one taken alone. Kuder (1945) considers this reliability adequate for group comparisons. However, Gates (1945) feels that the Alpha Test results should be interpreted cautiously since the "true score" of one child in twenty could possibly depart from his obtained score by more than plus or minus eight points of standardized score.

Since there is no exact criterion of mental ability, the validity of the Alpha Test cannot be measured directly; however, according to the test manual a biserial comparison of Alpha Test results with grade placement gave a validity co-efficient of the Non-verbal and Verbal tests of .78 and .86 respectively while the validity of the total score was .86.

A copy of the Otis Quick-Scoring Mental Ability Test: Alpha Test, Form A, is Appendix D.

Reading Vocabulary and Comprehension Test

Gates MacGinitie Reading Test (Primary Form) The purpose of administering the Gates MacGinitie Reading Test was to screen from the total grade one population those pupils who could be identified as low-achievers in reading and also to serve as a pretest for the experiment. According to the manual this Test measures the following reading factors:

> The Vocabulary Test samples the child's ability to recognize or analyze isolated words. It consists of 48 exercises, each of which contains four printed words and a picture illustrating the meaning of one of the words. The child's task is to circle the word that best corresponds to the picture. The first exercises are composed of easy and commonly used words, grouped with words selected to be only slightly similar or confusing. Gradually the words become less easy and common and are presented with words more similar in details and general appearance.
>
> The Comprehension Test measures the child's ability to read and understand whole sentences and paragraphs. This ability includes many skills not involved in the mere ability to recognize words. The child must grasp the total thought clearly if he is to answer correctly. The test contains 34 passages of increasing length and difficulty. Each passage is accompanied by a panel of four pictures. The child's task is to mark the picture that best illustrates the meaning of the passage or that answere the questions in the passage.

The reliability of the Gates MacGinitie Test has been established by the authors using the alternate form reliability co-effiecient. The co-efficient reported for the Primary A Forms 1 and 2 is .86 and .83 for vocabulary and comprehension respectively. No report was found to establish the test's validity. Copies of the two forms of this test are found as Appendices B and C.

Modalities of Learning

The Mill's Learning Methods Test. The LMT was the major instrument used in this investigation. This test is designed to measure a child's relative ability to learn to recognize words from

different teaching methods. Each teaching method caters to a different sensory mode. The four teaching procedures used in the test are the visual method, the phonic or auditory method, the kinesthetic or tracing method, and a combination method.

To use the LMT, the examiner administers a pretest to identify a pool of words not known to the child. Forty words are selected at random from the unknown words and arranged into sets of four. Each set of ten words is taught to the child for exactly fifteen minutes. At the end of this teaching time, an immediate recall test reveals the number of words learned. A recall test is administered at a later date to provide a retention score. On subsequent days the other three methods of teaching are used. After the four delayed recall scores have been averaged, any single score can be compared with this mean to determine the relative efficiency of a particular instructional method for the student tested; consequently, his more efficient modality of learning can be identified. Equivalent forms reliabilites ranging from .91 to .97 are reported for the four methods by Mills (1955, p. 1124).

Materials and Administration of the LMT. Materials used in the administration of the test include picture-word cards, test record forms, and a manual of directions. The picture-word cards contain selected words from the Author's Word List for Primary Grades by Krantz. The words, all nouns, have been chosen from primary, first, second and third grade levels. Although the words are all nouns, the pictures representing them led to some confusion during the preliminary study. For example, the picture-word card for 'bird' was named 'Robin'. Such confusions resulted in an adjustment being made in the testing

situation. Any child who identified a picture-word card incorrectly was told the correct name.

The Test Words of the LMT. To select the test items to be used in the study, the words from the picture-word cards of the LMT were typed onto a master stencil in ascending order of difficulty and the resulting words on the mimeographed form were presented individually to each child. Each child was allowed to see the word for a five second exposure time. If at the end of five seconds exposure the child did not recognize the word, he was told the word and then shown the next. As soon as the child had missed forty words the test was discontinued. From the forty unknown words, ten words were selected at random for each teaching method and were recorded on the test record form. Since the pupils differed in their word recognition skills, the ten words in each testing situation varied in difficulty from primer level to second grade. The pretest to select the forty words was administered to the test population on the last teaching afternoon prior to the main testing period.

The child's age, sex, grade, chronological age and intelligence quotient were also recorded on the individual record form at this time.

Time Schedule of the Testing Periods of the LMT. The testing periods for the LMT were conducted according to the following sequence. The first day, ten new words were taught by the visual method followed by the immediate recall test; the second day, the delayed recall test for the visual method was administered followed by the teaching of the ten new words by the phonic method. The immediate recall test for the phonic method was then given. The third day, the delayed recall test of the phonic method was administered followed by the teaching of the

ten new words by the kinesthetic method. The immediate recall test was given. The fourth day, the recall test for the kinesthetic words was administered followed by the teaching of the ten new words by the combination method. The immediate recall test of the combination method was then given; and, finally on the fifth day the delayed recall test of the combination method was given. Although there was a possibility of creating a sequencing effect in the administration of the test by testing all children in the same method on the same day, it was felt by the investigator that this was the only practical method to allow close supervision of the testing situation so that the techniques used would be as uniform as possible among the nine test administrators.

A summary portraying the time schedule for the administration of the LMT is given in Table V.

The Teaching Methods Used in the LMT. The four training methods (visual, phonic, kinesthetic and combination) used during the testing periods involve specific steps which were used in the same order for each subject. However, as a result of observations made during the pilot study with students of similar age and grade placement, some adaptations to two teaching methods as outlined in LMT were made. The adaptations made are noted in the description of each method following.

Visual Method. Using the ten "unknown words" from the controlled list provided, the child was taught recognition of these words stressing exclusively the visual appearance and other visual clues of the words through the use of the following procedures for fifteen minutes:

TABLE [illegible]

TIME SCHEDULE FOR THE ADMINISTRATION OF THE LMT TO CHILDREN OF TEST SAMPLE

Section of LMT Administered	First Day	Second Day	Third Day	Fourth Day	Fifth Day	Sixth Day
1.	Pre-test of word Recognition		Test of Delayed Recall (Visual Method)	Test of Delayed Recall (Phonic Method)	Test of Delayed Recall (Kinesthetic Method)	Test of Delayed Recall (Combination Method)
2.		Teaching of 10 Words (Visual Method)	Teaching of 10 Words (Phonic Method)	Teaching of 10 words (Kinesthetic Method)	Teaching of 10 words (Combination Method)	
3.		Test of Immediate Recall (Visual Method)	Test of Immediate Recall (Phonic Method)	Test of Immediate Recall (Kinesthetic Method)	Test of Immediate Recall (Combination Method)	

1. The ten picture-word cards were presented to the child with picture side up. He was asked to look at the picture, then at the word, and to say what it was. This was done with all ten of the cards.

2. The cards were presented a second time with picture-side up. This time when the picture and the words were shown, the child made a sentence using the word.

3. A game of solitaire was played with the child. This was done by placing all ten of the cards with word-side up before the child. As he said each of them he was asked to turn the card over to check his accuracy with the picture.

4. The child was asked to arrange the words in a meaningful sequence to form a sensible phrase or sentence. In some instances he was able to use three or four of the words in a single sentence. He was allowed to add any other necessary words to make a complete sentence.

5. The relative length of various words was discussed with the child. The words were printed on the blackboard on paper, and then the child was asked the following questions: Which is the longest word? Which is the shortest? He matched words which were of the same length. He was asked to arrange the words in groups by stacking all the three letter word cards in one stack, the four in another stack, and so on.

6. A figure, the outlines of which follow the shape of Gestalt of each one of the words, was drawn on the blackboard. For example, a box or figure depicting the word 'FORM' would be tall at the beginning following the height of the letter 'f' and then take a long, low rectangular shape for the remainder of the word. After all ten shapes had been drawn, the child was asked to match these various

shapes with the words for which they stood.

Adaptation. Since some of the pictures on the word cards were ambiguous in what object was being represented, the subject was told the noun if he did not identify it precisely after a five-second exposure. e.g. fly was named insect. To correct this, the test administrator identified the picture representation as fly to reinforce the particular association required.

Phonic or Auditory Method. Using the ten new "unknown" words from the controlled list provided, the child was taught recognition of these words, stressing exclusively the sound qualities of the words through the use of the following teaching procedures:

1. The words were printed on the blackboard (or paper), then said slowly with the child repeating the word after the examiner. The child was asked to make a sentence with the word to ensure that he understood the meaning. Pointing to the opening letter of the first word the examiner said, "This is the letter ___; it makes the sound ___, etc." The child repeated the separate sounds after the examiner did this with each word. Then the child tried the entire word sound by sound by blending the different sounds into one whole until it was a unified, complete word. As much of this as possible was done in the first four or five minutes of the lesson.

2. The child was asked to think of otherwords beginning with the same sounds, or words having the same middle sound as the one being studied. The child arranged the cards (the picture-side of the cards was never presented during the phonic lesson) in different groups as he identified and classified the ten words as to common beginnings or endings.

3. The child was helped to think of words that rhyme with the word the examiner was trying to teach him.

4. The child identified familiar sounds or little-words-in-big words of those being studied.

5. All ten words were repeated for the child with exaggerated sound stress, with short pauses between the sound elements. The child was asked to listen closely to the sounds as the examiner pointed to the particular part of the word being sounded. Then the child was asked to say the word.

6. The child was asked to say the words now without the examiner's help. He was instructed to listen closely to the sounds as the examiner pointed to the letters as he slowly pronounced the words. (Help was given to the child with those words in which he still lacked recognition).

Kinesthetic Method. Using ten words from the "unknown" controlled list provided, the child was taught recognition of these words by the kinesthetic or tracing method.

1. The child was presented with the ten words written on paper, using crayon in a large size manuscript-printing, with the letters approximately two inches high. The child traced over the first word with his finger using perhaps only one finger to point to the letter and trace it; he said the word part by part as he traced it. The word was always traced with the finger in contact with the paper. Then each of the following steps was carried out with the first word presented before a second word was introduced.

2. The child repeated the tracing several times. As he traced the word, he said it (he was not allowed to turn up the picture-side of the word card).

3. After several trials at tracing and saying, the child wrote out the word, saying it while he wrote. He carried out this part of the lesson without looking at the copy. He was not permitted erasures while attempting to reproduce the word. When the child attempted to erase, he was to retrace the word with his finger and then to rewrite it.

4. The tracing and writing was repeated until the child was able to reproduce the word in his own handwriting at least once. Then the regular "test size word card" with the smaller print was presented and the child was asked to identify it.

5. Steps "1" through "4" were carried through with all ten of the words.

Adaptation. Although the manual allowed the use of a blackboard and chalk in the presentation as well as paper and crayon and teaching of the words by his method, for the sake of uniformity, all test administrators presented and taught the words using only paper and crayon.

Combination Method. The other methods (visual, auditory, and kinesthetic) were now combined into an eclectic method for the fourth procedure. Using a new set of ten "unknown" words, word recognition was taught by giving equal stress to the visual, auditory, and kinesthetic approaches.

1. The ten picture-word cards were presented to the child with picture-side up. He was asked to look at the picture, then at the word, and to say what it was. This was done with all ten of the cards. The child said the word several times while looking at the picture.

2. The initial sounds of the letters were presented as the examiner pointed to them. Also ending sounds were stressed. The

child was asked to find words that rhyme with those listed, or words that begin or end like those listed. The child was asked to find any common phonograms or little-words-in-big-words. The ten words were repeated slowly as the examiner stressed the sounds as he pointed to them. The child repeated them after the examiner.

3. The ten words were written on the paper. The child traced over the words with his finger (the finger always being in contact with the paper) saying the word part by part as he traced it.

4. While looking at the picture of the word (the word was covered over) the child was asked to write the word. After he had written the word correctly, he was asked to sound it out. He was helped in stressing the initial and ending sounds.

5. If fifteen minutes had not elapsed since the lesson began, step "4" was repeated until exactly fifteen minutes had been spent on this lesson.

Scoring Procedures. In order to score the LMT, the number of correct responses for the four delayed recall tests were totalled, and divided by four to provide an individual's mean score. For ease in interpretation, the manual commented that if an individual's scores deviated in either direction by more than 1.5 from his own mean, a greater deviation than would be found in approximately sixty-eight per cent of all cases would have occurred and this would probably be clinically significant. If one or more of an individual's scores deviated by as much as three from his own mean, this was a greater deviation than occurs in approximately ninety-five per cent of the population and would be of statistical as well as clinical significance. For the purpose of this study a deviation of 1.5 from the mean was considered sufficiently discriminating to identify modes of learning.

Screening Tests

Tritone Individual Audiometer Test. The individual audiometric screening tests were given to all pupils in the total grade on population of the Grande Prairie School District who had been classified as low achievers in reading for the purpose of this study. The screening tests were administered by the investigator who had been trained in the conducting of such tests at the Reading and Language Center of the University of Alberta.

The testing instrument, the *Tritone-Audiometer* is a portable precision all transistor three-frequency screening instrument equipped with one synamic earphone designed to fit the requirements of limited range rearing tests. The three frequencies incorporated in this audiometer are 500 cycles, 200 cycles, and 4,000 cycles. Each frequency is selected by means of a rotary switch. Three push-button switches allow the examiner to select any one of three levels of intensity, 15 decibels, 30 decibels, and 50 decibels. These hearing levels correspond to normal hearing response, a mild hearing loss, and a serious hearing loss at the particular frequency being tested. In the testing situation each subject was seated opposite the examiner but facing away from him so the subject was unable to see the manipulation of the controls. After instruction in how to respond, each subject held the earphone to the ear being tested, and was tested for 3 seconds at the 500 cycle position for the three levels of intensity. The same procedure was carried out at the 2,000 and 4,000 cycles. If the subject heard all tones at the 15 decibel level he was considered to have normal hearing; if he had difficulty, he was dropped from the study and referred to the school health nurse.

For the test to be accurate, it was administered in relatively noise free environments. However, it must be taken into consideration that classrooms are not noise free environments and pupils have to adjust for this.

Eames Eye Test. In administering the screening tests for visual efficiency the investigator was assisted by the Assistant Superintendent of Schools. The Assistant Superintendent, a reading clinician, was familiar with visual surveys of elementary school children.

The Eames Eye Test includes subtests: Tests 1-3, which test far point and near point acuity, and tests 4-5 which test for coordination and fusion respectively.

In order to administer these tests a space of twenty feet is required such that test charts may be hung at eye level in "good and even illumination" but not direct sunlight. In tests 1-3 for visual acuity each eye is covered as the subjects point in the direction of an "E" shaped character exposed at twenty feet and also at reading distance. The "E" is shown in various positions. The subject reads these at a distance of twenty feet. He reads with and without a 1.50 lens.

Tests 4-5 could not be administered for the purposes of this study because of the inaccessability of the hand stereoscope.

Subjects who failed any one of the test 1-3 were eliminated from the study and referred to the school health nurse.

In discussing validity of the Eames Eye Test, Robinson (1946) reported that although the manual reported a 97 per cent agreement with the findings of an eye physician based on a complete eye examination of eye difficulties requiring corrective treatment, her

own study using 79 unselected school children found that this test did not prove to be valid. However, she reports that she used the 1940 edition of the test which did not include a subtest for near acuity. Robinson concludes her review by stating:

> "In spite of possible inadequacies, the Eames Eye Test undoubtedly fulfills its stated purpose of being more discriminating than the Snellen Chart and of being particularly useful in identifying ocular difficulties of pupils having reading disability."

Although reporting that the Eames Eye Test has some limitations Vernon (1945) also feels that this test can be recommended for its stated purpose.

TREATMENT OF THE DATA

The sixty pupils retained in the test sample were only those whose hearing and vision fell within the normal range as tested by the Tritone Individual Audiometer Test and the Eames Eye Test.

The data obtained from the pretest and posttest reading results and information on intelligence and chronological age were processed by the Division of Educational Research Services at the University of Alberta, Edmonton.

Analysis of the data took the form of factorial experiments designed to evaluate the effect of the treatment variable and certain levels of classification variables (sex and intelligence). In each of the experiments the criterion or dependent variable was the mean-gain reading score. The total sample (N=60) was involved in each of these calculations. A brief description of each factorial experiment is given.

Treatment Group Scores versus Non-Treatment Group Scores

To test the null hypothesis that there are no significant

differences between the mean-gain reading scores of grade one children low in reading achievement who are taught by a mehtod which caters to their preferred mode of learning and the mean gain reading scores of grade one children low in reading achievement who are taught by the usual classroom method, differences between the mean-gain reading scores of the treatment and non-treatment groups were calculated after the six-week experimental period. The t-test was used to determine whether a significant improvement had occurred as a result of the special teaching methods used.

Influence of Intelligence

To test the hypothesis that there is no significant interaction between intelligence and the special teaching methods used a two by three analysis of variance program was used. The purpose of the program was to carry out a two-way analysis of variance using a least square S solution. The program produced F-ratios and probability levels at the .01 and .05 levels of significance.

The two levels of factor B, the experimental variables were treatment and non-treatment.

The three levels of factor A, the classification variable, were intelligence quotients. The criterion as dependent variable was the mean-gain reading score obtained from the pretest and posttest scores of the *Gates MacGinitie Reading Test*.

Influence of Sex

To test the hypothesis of no significant relationship between sex and being taught words through preferred modalities of learning, a two by two analysis of variance program, was used. The purpose of

the program was to carry out two-way analysis of variance using a least square S solution. The program produced F-ratios and probability levels.

The two levels of factor B, the treatment variable, were treatment and non-treatment.

The two levels of Factor A, the classification variable were the male and female.

The criterion or dependent variable was the pupil's mean-gain reading score obtained from the two scores of the Gates MacGinitie Reading Test.

To further test the interaction between sex and treatment it was decided to use a multiple linear regression program, with the pretest score of the Gates MacGinitie Test as a co-variate and the posttest score as the criterion. The multiple linear regression model had the advantage of estimating the contribution of sex as a predictor of the posttest score. This was accomplished by restricting this variable from the full model.

SUMMARY

The research design of a six-week experimental study into the effectiveness of teaching word-recognition skills through the preferred modalities of low achievers in reading in grade one has been presented in this chapter.

Low achievers were in reading were identified by the use of the Gates MacGinitie Reading Test. These low-achievers were screened for visual and auditory difficulties. Those who were identified as having normal vision and hearing were administered the LMT to discover their preferred modes of learning. Those who were identified

as having preferred modes of learning were randomly assigned to a treatment or a non-treatment group. For a period of six weeks the treatment group were taught by methods suggested by LMT which catered to their preferred modes of learning while the non-treatment group were taught by the teachers' usual classroom methods which may or may not cater to their preferred modes of learning. At the end of the experimental period a second form of the Gates MacGinitie Reading Test was administered to determine gain in word-recognition skills. The resulting data from the test instruments were processed using t-test analysis of variance and multiple linear regression programs.

CHAPTER IV

ANALYSIS OF DATA AND INTERPRETATION OF RESULTS

The purpose of this chapter is to present an analysis and interpretation of the observations and statistical data obtained from a six-week investigation into the effectiveness of teaching to the preferred learning modalities of low-achievers in reading in grade one.

The data obtained from test instruments were processed by the investigator and further statistical analysis was carried out by programs developed by the Division of Educational Research Services at the University of Alberta. The findings are presented in tabular form, analyzed and explained. For the purpose of this study it was decided to accept as statistically significant a probability level of .05.

This chapter reports the results of the t-test used to examine the major hypothesis of the study, and reports the analyses of variances used to test the two minor hypotheses, the interaction of sex and intelligence, and preferred modalities of learning. A second section discusses teacher observations of the pupils performances on the LMT and their behaviour during the six-week study. The chapter concludes with a summary of the findings.

I. THE STATISTICAL TREATMENT OF DATA

Analysis of Pupils' Reading Scores and Non-Treatment Group Scores

The first hypothesis tested was that there would be no

significant differences between the mean-gain reading scores of low-achievers in reading in grade one who were taught by the teachers' usual classroom methods and low-achievers in reading in grade one who were taught by methods tailored to their preferred modalities.

To examine the significance of the difference in the mean gain scores from the pretest to the posttest a two-tailed t-test was used. The t-test in Table VI shows a resulting t value of -0.302 which is not significant. This indicates the treatment did not significantly effect the word-recognition skills of the low-achievers in reading who were taught by methods which were tailored to their preferred modalities.

However, an informal analysis of the gain scores reveals that of the fifty-seven students involved in taking the posttest all but five made gains. In some instances gains approaching two standary deviations above the mean were noted. For example, raw gain scores of 29, 26, and of 27, 20 and 19 were made in the non-treatment group and treatment group respectively. At the other end of the spectrum raw gain scores of -3, -3, and of -4, -4 in the non-treatment group and treatment group were also noted.

While it is true, then, that most of the treatment subjects gained in word recognition skills according to their scores made on the Gates MacGinitie Reading Test, it is also noted that comparable gains were made by the non-treatment group. A possible reason for this lack of difference between the scores of the control and experimental group is that the length of the treatment period may not have been long enough for the students to adjust to the new method of presentation and/or the increased individual attention that these children of both groups received.

TABLE VI

A STATISTICAL ANALYSIS OF MEAN GAIN READING SCORES OBTAINED BY BOTH TREATMENT AND NON-TREATMENT STUDENT GROUPS

Reading Test	Mean-Gain Scores For:		Standard Deviations For:		t	p (two-tail)	s
	Treatment Group N=30	Non-Treatment Group N=30	Treatment Group	Non-Treatment Group			
Gates MacGinitie Reading Test Primary, Form A	9.75	8.66	11.52	15.18	-0.302	.76	NS

In addition, there were instances where a complete reversal of the hypothesis occurred in that after treatment two of the subjects scored lower on the posttest than they had on the pretest. Possibly these two students failed to adapt to the new method of presentation.

In general, the hypothesis that teaching word recognition skills through a child's preferred modality as identified by the LMT is more effective than the usual methods of teaching these skills in the school system in which the investigation was carried out was not supported by this study. However, informal observations made by the teachers indicated that there were benefits obtained by students who were taught through their preferred modalities which were not picked up by the *Gates MacGinitie Reading Test*. For example, several teachers commented that students appeared to suffer less tension when taught in this manner and were happier in the classroom. Some students seemed to be more relaxed and participated more actively in the reading class. It was noted that some children made an improvement in all subject areas and not just in reading. This, however, could be a result of the increased individual attention being given to the child. The teachers observed in some instance changes in attitudes towards reading. Some children who had been apathetic were eager to learn.

Similar observations were not made regarding children in the control group.

Analysis of Variance Intelligence and Treatment

To test the hypothesis of no significant relationship between intelligence and the teaching of word recognition skills through preferred modalities of learning, the anova of variance program was used. The analysis of variance was as a three by two factorial

experiment with three levels of factor A (intelligence) and two levels of factor B (treatment). The criterion or dependent variable was the mean-gain reading score. A summary of the analysis of variance is shown in Table VII.

An analysis of the data obtained as a result of this program reveals that the F-ratios are not significant. Intelligence does not account for any of the variance in the scores except what is expected by chance. In a similar manner the fact that one group was taught in a particular manner seems to have made no difference to its score. In addition, there is no significant interaction between a child's intelligence and the teaching method. This means that a very intelligent child who is taught by a method which caters to his preferred mode of learning performs no better than a child low in intelligence who is taught by a method which caters to his preferred mode of learning.

Therefore, the null hypothesis is upheld.

Analysis of Variance: Sex and Treatment

An analysis of variance program was used to test the hypothesis of no significant relationship between sex and the teaching of word recognition skills through preferred modalities. The analysis of variance was designed as a two by two factorial experiment with two levels of factor A, sex, and two levels of factor B, treatment and non-treatment. The criterion or dependent variable was the mean-gain score. A summary of the analysis is recorded in Table VII.

The resulting F-ratio of .250 for sex as a contributing factor to the amount of variance, and .026 for treatment as a contributing factor to the amount of variance gave no reason to reject the null

TABLE VII

ANALYSIS OF VARIANCE: INTELLIGENCE AND TREATMENT FOR MORE PREFERRED MODES OF LEARNING

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Square	F-Ratio	P
A. Intelligence	313.05	2	156.5	.86	.42
B. Treatment	.93	1	.93	.00	.99
AB. Interaction Intelligence x Treatment	432.41	2	216.2	1.191	.31

TABLE VIII

ANALYSIS OF VARIANCE SEX AND TREATMENT FOR PREFERRED MODES OF LEARNING

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F-Ratio	P
A. Sex	44.93	1	44.9	.250	.61
B. Treatment	4.63	1	4.62	.026	.87
AB. Interaction Sex x Treatment	427.15	1	427.15	2.3	.12

hypothesis. However, the F-ratio of 2.3 for interaction between sex and treatment was approaching significance at the 10 per cent level of confidence. Even though this level is not acceptable to uphold the hypothesis it is an indication that treatment may be superior for one of the sexes, consequently a chart showing the mean-gain scores for each of the four cells of the experiment was developed. The chart is shown in figure I. An analysis shows that while treatment appeared to have an adverse effect on girls, the boys appeared to make gains. This may indicate that girls are less flexible and adapt less readily to changes in the learning environments.

To further test the significance of this interaction it was decided to process the same data using a multiple linear regression program. The program was designed to use the pretest as a covariate and the posttest as the criterion. The F-ratios obtained as a result of this experiment are given in Table IX. It can be seen that the interaction is not significant. Consequently the null hypothesis is upheld. Sex is not a significant factor in the teaching of word recognition skills through the preferred modalities of low-achievers in reading in grade one.

TEACHERS' OBSERVATIONS OF STUDENT PERFORMANCE DURING THE STUDY

Observation on Students Test Performance on the LMT

If a student did not immediately recognize a word on the immediate or delayed recall test he reacted characteristically in one of the following ways: (1) named the word incorrectly, often by using as a substitute a word that began or ended with the same letter, (2) selected as a subtitute a word which was of the same general configuration or, (3) guessed.

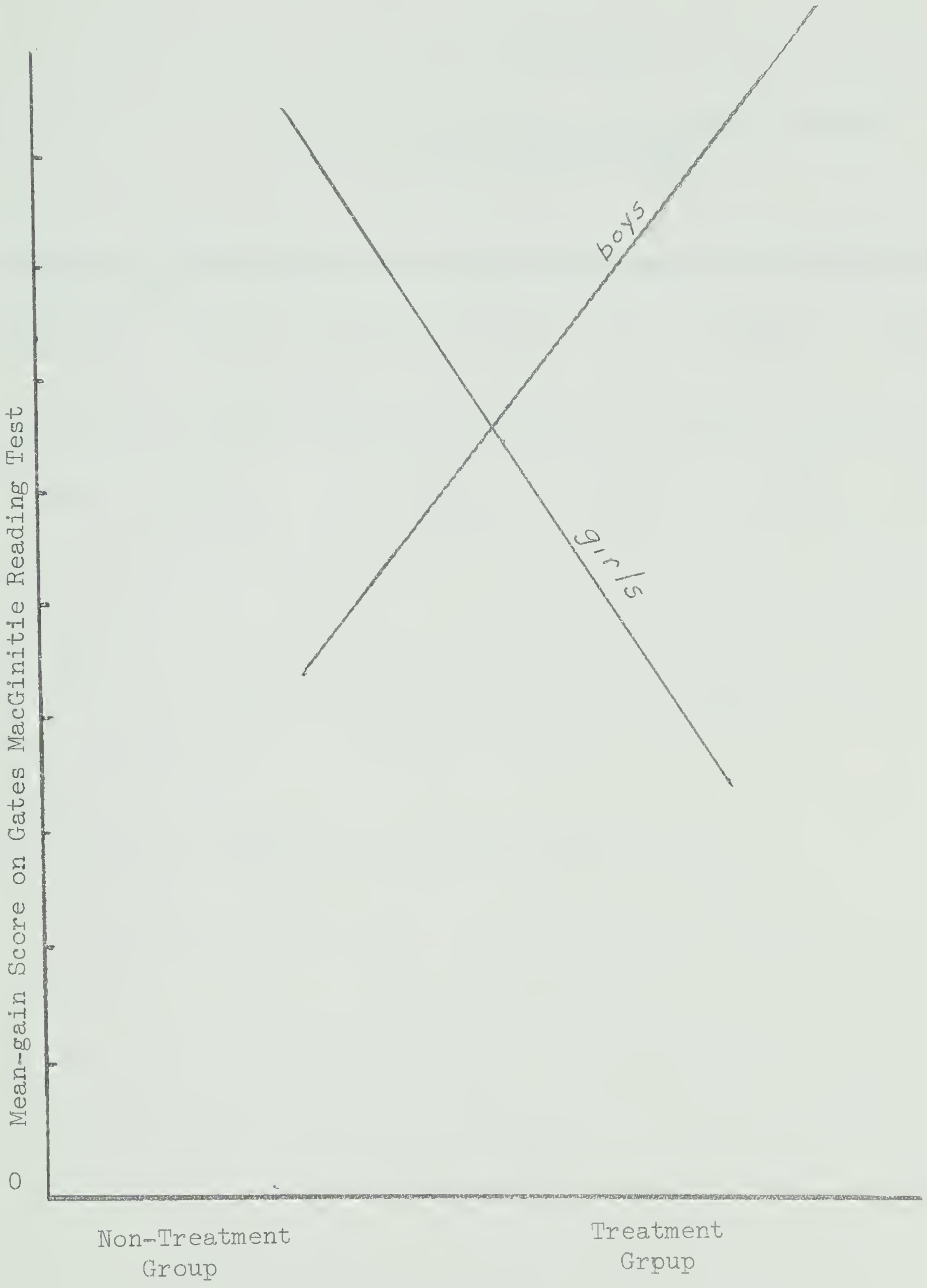

FIGURE I

A COMPARISON OF THE MEANS-GAIN SCORED BY SEXES ON THE GATES MACGINITIE READING TEST, PRE-TEST AND POST-TEST

TABLE IX

CONTRIBUTION OF SEX VARIABLE WITH POSTTEST AS CRITERION (N=57)

Restricted	RSQ Full	RSQ Restricted	dF	F-Ratio	Probability
Sex	.36764	.36761	1/53	.0024	0.9614

The most common error appeared to result from guessing. This might be indicative that these students had developed a particular method by which they attacked unknown words. That is, they habitually guessed at the unknown word in the absence of picture clues or they chose a dominant feature of the word by which they recognized it. Very little attempt was made by the students involved in the experiment to recognize a word by a phonic or a kinesthetic method.

It appeared to the investigator and to the other examiners that the students relied heavily on a visual procedure to attack unknown words.

It was sometimes found that a student did not recognize a word on the immediate recall test but did on the delayed recall test. This improvement of memory seemed to operate as a delayed type of learning. That is, the student forgot the word on the immediate test of recall but remembered it for the delayed test.

Observation of Students During Experimental Period

Although some students were identified as audiles by the LMT, they did not seem to learn well by the method set forth by Mills for audiles in the classroom situation. Possibly there is some conflict between the audile method as outlined by Mills and the usual classroom method. However, this did not appear to be the case with visiles, eclectics or kinesthetics. It is possible that if a child is familiar with a particular method of presentation then a deviation from this method becomes upsetting. On the other hand, instances reported where students appeared to gain much confidence as a result of being taught through their preferred modality although this could have been more a result of having greater individualized attention.

SUMMARY

The findings of a six-week investigation into the effectiveness of teaching word recognition skills through preferred modalities of low-achievers in reading in grade one have been presented in this chapter. The major findings of this study were that although the LMT did identify preferred modalities in some low-achievers, a substantial percentage of these students either did not have a preferred modality or the LMT was not sufficiently discriminating to identify them. Secondly, for low-achievers generally in reading in grade one taught word recognition skills through their preferred modalities as identified by the LMT for a period of six-weeks no significant improvement in these skills occurs. Thirdly, intelligence does not act as a significant factor when students are taught word recognition skills through their preferred modality as indicated by the LMT and finally, sex does not act as a significant factor when students are taught word recognition skills through their preferred modality of learning.

CHAPTER V

SUMMARY, CONCLUSIONS, LIMITATIONS, IMPLICATIONS AND RECOMMENDATIONS

This study investigated the effectiveness of teaching word recognition skills for a period of six weeks to low-achievers in reading in grade one through their preferred learning modalities as identified by the _Mill's Learning Methods Test_. The population for the study was drawn from the total grade one population of a small urban area. Low-achievers in reading were identified by the use of the _Gates MacGinitie Reading Test_. Intelligence quotients were obtained from class records. Visual and auditory screening procedures were utilized in order to limit the sample to those students who had normal vision and hearing. The preferred modalities of learning of low-achievers were identified by the use of the _LMT_ which was administered individually to the ninety-two children. The _LMT_ identified sixty of these children as having a preferred mode of learning.

The final sample population of sixty children was randomly assigned to a treatment or a non-treatment group. The treatment group was taught new words in the grade one reading program by methods which catered to their preferred modalities of learning by their regular classroom teachers, while the non-treatment group were taught the new words by their classroom teachers by their usual teaching methods. A second form of the _Gates MacGinitie Reading Test_ was administered to the groups to measure the mean-gain reading score.

The data obtianed from the test results were processed by the Divisional of Educational Research Services to test the null hypotheses

using analysis of variance, t-test and multiple linear regression programs.

The conclusions drawn from the findings of the study will be followed by limitations, implications, and recommendations.

I. FINDINGS AND CONCLUSIONS

Hypothesis I

> There are no significant differences between the mean-gain reading scores of grade one children low in reading achievement who are taught by a method which caters to their preferred mode of learning and the mean-gain reading scores of grade one children low in reading achievement who are taught by the usual classroom method which stresses the visual-auditory approach.

Differences between means were not statistically significant when t-tests were applied. The hypothesis is upheld. For the pupils involved in this study a significant improvement did not occur in their word-recognition skills as a result of a six-week treatment involving teaching to their preferred modalities of learning. It may be concluded that for the children in this sample there was no significant differences between the mean-gain reading scores of grade one children low in reading achievement who were taught by a method which caters to their preferred mode of learning and the mean-gain reading scores of grade one children low in reading achievement who are taught by the usual classroom method which stresses the visual-auditory approach.

Hypothesis II

> There is no significant interaction between intelligence and treatment.

The analysis of variance revealed that there was no significant interaction between intelligence and treatment when pupils low in reading achievement in grade one are taught by methods which cater to

their preferred modalities of learning, therefore, the null hypothesis was upheld. It may be concluded that for the children in this sample, there was no significant interaction between intelligence and treatment.

Hypothesis III

There is no significant interaction between sex and treatment.

The analysis of variance revealed that the interaction between sex and treatment when pupils low in reading achievement in grade one are taught by methods which cater to their preferred modalities of learning, was approaching significance at the ten per cent level. However, when this interaction was further tested by a multiple linear regression model using the posttest score as a criterion and the pretest score as the covariate no significant interaction was found. Consequently, the null hypothesis was upheld. It may be concluded that for the children in this sample there was no significant interaction between sex and treatment.

LIMITATIONS OF THE STUDY

A limitation of this study was the size of the final sample and the length of the treatment period. Although the total population of the urban district was originally involved in the study, the final sample was reduced to sixty pupils by visual and auditory screening procedures, the LMT and the Gates MacGinitie Reading Test. Of these sixty only thirty were given treatment, the other thirty acting as a control. With such a limited sample, large gains by individuals in their scores on the Gates MacGinitie Reading Test had a disproportionate effect on the mean-gain scores. For example,

several individuals in both the control and treatment groups made raw gains of over twenty marks which is approaching two standard deviations above the mean. Consequently any one individual could have an undue influence upon the final results of the study. It is suggested that this study be replicated using a larger population and conducted over a longer period of time.

A second limitation is the limited amount of similarity and continuity found in the teaching of reading in grade one. Teaching is an individual art. Consequently, the teacher variable was found to be a hard factor to control. Although each teacher follows the guide book to reading series used in the district, many different approaches to the teaching of reading have been adopted. Some teachers rely heavily on a workbook approach, some on a blackboard approach, and still others on an extensive use of visual aids. The degree of participation allowed the students in the reading lesson also varies greatly.

A third limitation was the length of the treatment period. The pupils in the experiment had been in grade one classrooms for a period of eight months and had been taught primarily by visual-auditory methods. Since the experimental period had only lasted six-weeks, sufficient time might not have been allowed for an adjustment to have occurred to new teaching methods not stressing visual or auditory methods.

A fourth limitation was the use of the *Gates MacGinitie Reading Test* both as a pretest and a posttest. The *Gates MacGinitie Reading Test* measures both word recognition skills and comprehension and whereas it cannot be denied that comprehension is vital to the reading act for the purposes of this study it may have been preferable to use

a list of words from a basic reader as the testing instrument to measure gain in word recognition skills.

That is, if the children in the study had been identified by the use of the Gates MacGinitie Reading Test as low-achievers in reading, then taught a particular set of words during the experimental period and tested on their gain in recognition of these words the study could have been more tightly controlled.

Finally, the time of the year, when teachers are more concerned with the promotions and examinations than experimentation, might not have been most opportune time to conduct such a study.

IMPLICATIONS OF THE FINDINGS

Inherent in the philosophy upon which our society and our school system is based is a belief in the value and the human dignity of the individual. To further this belief educational institutions have as one of their objectives the releasing of each learner's unique potentialities. A major concern of the school, then, becomes the creating of a learning environment which allows for the maximum development of each individual's capabilities. However, a review of the literature and research in the field of reading reveals that many educators seem to be far more concerned with the methods of instruction rather than with methods of learning, or as Wepman (1960) suggests much reading research is method-centered rather than learner-centered. However, if one of the major objectives of education is the maximum development of each individual's unique potential reading research should be concerned with discovering exactly how each child learns to read. That is, isolate his particualr style of learning, and then determine the teaching method or, combination of teaching

methods which will facilitate maximum learning through this style. A complication to reading instruction in grade one is caused by developmental characteristics of beginners. This implies that beginners vary in their development of various perceptual processes. This concept has been borne out by this study, for the LMT did identify some pupils with preferred modes of learning. It may be possible that teachers, by using selected diagnostic instruments plus their own informal observations could determine the relative strengths and weaknesses of the beginners' perceptual processes. Teaching procedures could be adopted to cater to the children's strengths and to build up their weaknesses. For example, if a group of children were found to be weak in auditory perceptual tasks initially reading instruction could cater to the visual mode while supplementary exercises would be devised to improve auditory discrimination, blending and so on. On the other hand for children found to be weak in visual perceptual tasks, initially, reading instruction could cater to the auditory mode by emphasizing a phonic approach while supplementary exercises would be devised to improve the visual perceptual skills.

This will infer that teachers must be educated to be aware of the individual differences among Grade 1 beginners and be willing and know how to adapt methods and materials to tailor their programs for these individual differences. Administrators must be alert and willing to encourage teachers to adapt methods and materials and to provide the necessary staff and budget to enable this to be carried out.

The findings of this study would also indicate that testing programs should provide for the early identification of hearing and

visual difficulties of grade one students in September.

Although this study did not support the hypothesis that grade one children improve their word recognition skills when taught through their preferred modalities, gain was noted. In view of the study's limitations the hypothesis still bears further investigation.

SUGGESTIONS FOR FURTHER RESEARCH

During this investigation certain problems have been indicated which might be considered as warranting further research.

1. There is a need for further study to develop a test which would enable a teacher to more accurately identify a child's preferred modality of learning. The IMT is somewhat time-consuming to be used in a typical classroom.

2. The interrelationship of the perceptual styles of learning, visual, auditory, kinesthetic, and eclectic should be systematically investigated.

3. A study might be designed to evaluate the effects of using teaching methods in reading which cater to the preferred modalities of grade one pupils for their entire initial year in school.

GENERAL CONCLUSION

In the history of teaching reading, various methods have been advocated as the most effective in the teaching of word recognition. Three basic methods have been recommended at various times, the visual, the phonic, and the kinesthetic. However, there are many controversies among the various reading authorities over which method is superior. Although research has not demonstrated the clear superiority of any one teaching method, it has shown that certain methods are more

successful with certain types of pupils than with others. This suggests that if an individual possesses little aptitude to learn from the instructional method in reading which is being employed with him, then, the use of that particular technique is inefficient and could possibly contribute to later reading difficulties.

It has been suggested in this study, that the most effective reading program is one which is developed in terms of the particular needs of the individual learners. For example, it is suggested that some children develop a characteristic way of perceiving and a preferred sensory mode prior to their entrance into school. The most efficient method of teaching word recognition to these children could possibly be one that caters to their preferred mode while strengthening the other modalities.

In other words, it is the function of the school to discover as much as possible about an individual's particular style of learning and use this as the ultimate criteria in selecting the most appropriate learning experiences for the individual.

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APPENDICES

APPENDIX A

MANUAL OF DIRECTIONS FOR THE LEARNING METHODS TEST

MANUAL OF DIRECTIONS
FOR THE
LEARNING METHODS TEST

(Revised Edition)

PURPOSE OF THE TEST

The purpose of **The Learning Methods Test** is to aid the remedial reading teacher in determining the student's ability to learn new words under different teaching procedures. Basically it is a series of teaching lessons with testing to determine immediate and delayed learning and the appropriateness of the various methods for different individuals.

Harris and Roswell[5] have suggested such a series of procedures in an informal way. Murphy[9] and Sullivan[11] have also employed such a device but without the use of standardized procedures. Here we have tried to standardize the testing and the teaching steps in order that direct comparisons may be made with some degree of reliability. From the application of **The Learning Methods Test**, the teacher should be able to answer such questions as:

1. How many words can the child learn in a fifteen minute lesson?
2. How well does the child retain these words?
3. By what method does the child apparently learn most easily?
4. Does the child retain those learned by any one method more easily than those learned by other methods?

NEED FOR THE INSTRUMENT

The need for such an instrument as **The Learning Methods Test**, hereafter referred to as the LMT, has become urgent if the reading teacher hopes to make effective the time and effort expended in the individualized teaching of reading — either remedial or developmental. The following quotation reviewing recent research in this area points out this need:

> One fact that stands out clearly is that a given method does not always secure equally satisfactory results . . . a conclusion justified by experiments is that certain methods are more effective with given types of pupils than with others . . . Because of the complexity of the problem, the need is as urgent today as formerly for analytical studies and experiments which aim to determine the method, or combination of methods, most effective in teaching various types of pupils to read and conditions under which each secures most rapid progress.[8]

In the past, teachers and clinicians have had to rely on a hit-or-miss procedure in finding the best method for the individual student. One approach would be tried over a period of weeks or months, then if the student did not make expected progress or become antagonistic, that approach would be rejected and a different avenue attempted. Schubert[10] states, "Since it is not possible to tell which method will work best in an individual case, the teacher must be flexible and versatile." The LMT is an attempt to make possible such a diagnosis with a minimum of time, materials and effort and without harm to the student.

THE METHODS

It should be understood that there is no *pure* method or approach to the teaching of word recognition. All words have visual, phonic, and kinesthetic elements which cannot be divorced completely from each other. When we speak of the phonic method, we simply mean that stress is given to the auditory characteristics of the word and this stress becomes the differential between the various methods.

The four learning (or teaching) methods used in the LMT are:

1. *The Visual Method.* The child is taught recognition of words by stressing exclusively the visual appearance and other visual clues and associations of the words.
2. *The Phonic or Auditory Method.* Word recognition is taught by the sound qualities of the words.
3. *The Kinesthetic or Tracing Method.* The child learns to recognize words by tracing, writing, and other kinesthetic procedures as outlined by Fernald.[3]
4. *The Combination Method.* The above three methods are combined for the fourth procedure. Word recognition is taught the child by giving equal stress to the visual, auditory, and kinesthetic approaches.

TEST MATERIALS

1. *LMT Picture Word Cards.* Four sets of picture word cards have been devised for use with this instrument; the sets include primer (blue), first (peach), second (green), and third (pink) grade level words. The cards are two by four inches and are designed in the manner of Dolch's Picture Word Cards[1] as suggested by Gates[4] except that a colored card is used in order to prevent transparency and the LMT Picture Word cards are graded.

The words chosen for each grade level were selected from *The Author's Word List for the Primary Grades.*[6] This list was drawn from a compilation of frequencies of word use in 84 pre-primers, 69 primers, 84 first readers, 85 second readers, and 47 third readers in use in 104 representative school systems. Only the nouns that could be pictorially represented and possessed the more common sound qualities were included in the selection. There are 46 word cards for the primer level, 120 cards for the first grade level, 114 for the second grade level, and 130 picture word cards for the third grade level.

2. *Test Record Forms.* A test record form is necessary to record the forty words selected for the four methods, to record pertinent data about the student, to record the results of the immediate recall test after each fifteen minute lesson, and to record the results of the delayed recall tests. A completed sample record form is shown on page 26.

TEST ADMINISTRATION

1. Pre-test. — The selection of test items.

In order to determine the appropriate level of words to use for the LMT, a pre-test of word recognition is necessary. The LMT Picture Word Cards are administered to obtain the forty unknown words that are to be used later in the four teaching methods test situations.

If you are dealing with a beginning reader, you should select 40 word cards from the Primer Level which the child does not know. In order to obtain words of approximate

equal difficulty, words from ONLY ONE LEVEL should be used. That is, if 40 words from the Primer level cannot be found that the child does not know, then do not use any words from this level. Instead, make a check to find 40 unknown words on the first grade level or the next higher one.

The cards should be presented to the child word-side up. If, at the end of five seconds of exposure time, the child has not responded correctly to the word, tell it to him and go on to the next word card. This "unknown" word then becomes one of the training and test words and should be placed on a pile separate from the "known" word cards. Continue this process until all the cards on that particular level have been administered. Record the total number that were *not* recognized by the child on the test record form.

From the unknown words, select at random 40 cards. Do this by shuffling the stack thoroughly and then count off the first forty cards. Record these 40 words on the test record form in the space provided. The words are arranged on the record form into four sets of ten words each. This completes the pre-test.

The above described pre-test procedures generally take from 5 to 10 minutes; the time varies with the age, intelligence, reading level, and the degree of rapport established.

2. *The Learning Methods Training and Testing Procedures.*

A. On the test record form there are spaces provided for recording the teaching methods used for each set of words. For the *Method Used,* record one of the following in any order you desire: "Visual," "Kinesthetic," "Phonic," and "Combination." It is suggested that the order of *Method Used* be varied from child to child.

B. You are now ready to begin the first lesson. If you have recorded "Kinesthetic" as the *Method Used* for *Set 1,* then follow the specific teaching procedures outlined for the Kinesthetic Method on Page 31 of this Manual. If the "Phonic" has been selected for Set 1, then follow the teaching procedures outlined on page 30, etc.

C. The pre-test and *Set 1* learning methods are to be administered the first day. Total time for the two is approximately 20 minutes. It is important to adhere strictly to the 15 minute time limit allowed for each training session.

D. The delayed recall test for *Set I* and the administration of the learning methods for *Set II* are administered the second session. The delayed recall test should be administered for the previous set before any of the word cards for the new test are exposed. (See below for specific directions for administering the delayed recall test), This second session should be scheduled for 24 hours after the time of the administration of *Set I.* If it is impossible to have access to the child for 15 minute periods for four consecutive days, then arrange the appointments with a consistent time interval, i.e., every day or every third day, etc.

E. The delayed recall test for *Set II* and the learning methods lesson for *Set III* are administered for the third session.

F. The delayed recall test for *Set III* and the learning methods lesson for *Set IV* are administered for the third session.

G. It is necessary to see the child for a fifth day for a few minutes to administer the delayed recall test for *Set IV.* This completes the series of tests.

3. Delayed Recall Testing Procedures.

Before each 15 minute training session except the first, a delayed recall test is administered. This is simply a check of the child's recognition of the 10 words taught the preceding session.

Using the same 10 word cards used the last session as training material, expose the word-side of the card to the child. If he recognizes the word within the five seconds of exposure, record the response as correct (-|-) on the test record blank. If he does not remember the word, place a (O) by the word in the *Delayed* column on the record form. Record the total number of correct responses.

SPECIFIC TEACHING PROCEDURES

In order to obtain specific techniques or steps that would be typical of a particular method of teaching word recognition, activities were selected for each method on the basis of the frequency of mention in the literature available regarding the respective methods. It is necessary to use these standard teaching procedures in order to make a valid comparison between the various methods.

LEARNING METHODS TEST RECORD FORM

Child's Name: *Jack Smith* Date: *April* 2, 1955 Grade 3

Sex: *M* *Age* 9-3 I.Q. 96 Name of Intelligence Test *WISC*

Level of Word-Cards Used: *Primer*...... 1st *X* 2nd...... 3rd......

Set 1: Method *Phonic*

	Immediate	Delayed
1. nose	-|-	-|-
2. park	-|-	-|-
3. glass	O	O
4. hair	-|-	O
5. circus	O	O
6. candy	-|-	O
7. book	-|-	-|-
8. letter	-|-	-|-
9. basket	-|-	-|-
10. arm	-|-	-|-
TOTALS	8	6

Set II: Method *Kinesthetic*

	Immediate	Delayed
1. dress	-|-	-|-
2. animals	-|-	-|-
3. fish	-|-	-|-
4. mouth	-|-	-|-
5. people	O	-|-
6. hay	-|-	-|-
7. bowl	-|-	O
8. corn	-|-	-|-
9. sled	-|-	-|-
10. woman	-|-	-|-
TOTALS:	9	9

Set. III: Method *Visual*

1. yard	-|-	-|-
2. river	O	-|-
3. string	O	O
4. wagon	-|-	O
5. face	-|-	-|-
6. cap	-|-	-|-
7. nest	O	O
8. butter	-|-	-|-
9. pony	O	O
10. city	O	O
TOTALS	5	5

Set. IV: Method *Combination*

1. street	-|-	-|-
2. train	-|-	-|-
3. robin	O	O
4. game	O	-|-
5. car	-|-	-|-
6. meat	-|-	O
7. plant	-|-	-|-
8. lion	-|-	-|-
9. horse	O	0
10. room	O	O
TOTALS	6	6

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VISUAL METHOD

Using ten "unknown" words from the controlled list provided, teach the child recognition of these words stressing exclusively the visual appearance and other visual clues of the words through the use of the following procedures for 15 minutes:

1. Present the ten picture-word cards to the child with picture-side up. Ask him to look at the picture, then at the word, and to say what it is Do this with all ten cards.

2. Present the cards a second time with picture-side up. This time show the picture and the words and have the child make a sentence using the word.

3. Play a game of solitaire with the child. Do this by placing all ten of the cards with word-side up before the child. As he says each one of them, ask him to turn the card over to check his accuracy with the picture.

4. Ask the child to arrange the words in a meaningful sequence to form a sensible phrase or sentence. In some instances he will be able to use three or four of the words in a single sentence. He may add any other necessary words to make a complete sentence.

5. Discuss the relative length of various words. Print the words on the blackboard or on paper, and then ask the child the following questions: Which is the longest word? Which is the shortest? Have him match words which are of the same length. Ask him to arrange the words in groups by stacking all the three letter word cards in one stack, the four in another stack, etc.

6. Draw on the board (or paper) a figure, the outlines of which follow the shape or gestalt of each one of the words. For example, a box or figure depicting the word *form* would be tall at the beginning following the height of the letter *f* and then would take a long, low rectangular form for the remainder of the word. After all ten shapes have been drawn, ask the child to match these various shapes with the words for which they stand.

7. Repeat activity "1" as described above.

8. If after activity "7," fifteen minutes have not elapsed since the lesson began, continue repeating the steps in order, until exactly fifteen minutes have been spent on the lesson.

9. At the end of the fifteen minutes, administer the immediate recall test. Do this by exposing the word-side of the card to the child. If he responds correctly within five seconds of exposure of the word, record the right response by placing -|- on the test record form by that word in the "Immediate" column in the space provided. Do this for all ten words. Record the total number of correct responses.

PHONIC OR AUDITORY METHOD

Using ten new "unknown" words from the controlled list provided, teach the child recognition of these words, stressing exclusively the sound qualities of the words through the use of the following teaching procedures:

1. Print the words on the blackboard (or paper), then say the word slowly with the child repeating the word after you. Ask the child to make a sentence with the word to insure that he understands the meaning. Then point to the opening letter of the first word. Say, "This is the letter ..... It makes sounds such as ..... The next letter is the letter ....; it makes the sound of...., etc." Have the child repeat the separate sounds

after you as you do them with each word. Then have the child try the entire word sound by sound, then blending the different sounds into one whole until it is a unified, complete word. Do as much of this as possible in the first four or five minutes of the lesson.

2. Ask the child to think of other words beginning with the same sound as the first sound of .... or words ending with same sounds, or words having the same middle sound as the one being studied. Have the child arrange the cards (*never* present the picture-side of the cards during this phonic lesson) in different groups as he identifies and classifies the ten words as to common beginnings and endings.

3. Help the child to think of words that rhyme with the word you are trying to teach him.

4. Have the child identify familiar sounds or little-words-in-big-words of those being studied.

5. Repeat all ten words for the child with exaggerated sound stresses, with short pauses between the sound elements. Ask the child to listen closely to the sounds as you point to the particular part of the word being sounded. Then ask the child to say the word.

6. Ask the child to say the words now without your help. Have him listen closely to the sounds as you point to the letters as he slowly pronounces the words. (Do help the child with those words in which he still lacks recognition.)

7. If fifteen minutes has not elapsed since the lesson began, continue repeating the steps in the order listed above until exactly fifteen minutes have been spent on this lesson.

8. At the end of fifteen minutes, administer the immediate recall test for these ten words.

KINESTHETIC METHOD

Using ten words from the "unknown" controlled list provided, teach the child recognition of these words by the kinesthetic or tracing method.

1. Present the child with the ten words written on the bla~~ckboard~~ (or paper; if you use paper, use crayon or very soft lead pencil in a large size manuscript-printing, with the letters approximately two inches high). Have the child trace over the first word with his finger using perhaps only one finger to point to the letter and trace it, saying the word part by part as he traces it. The word should always be traced with the finger in contact with the paper. Then do all of the following steps with the first word presented before introducing a second word.

2. Have the child repeat the tracing several times. As he traces the word, he will be saying it. (Do NOT ask him the sounds of the letter or call attention to any of the sounds; also, do not allow the child to turn up the picture-side of the word card.)

3. After several tries at tracing and saying, have the child write out the word, saying it while he writes. He should carry out this part of the lesson without looking at the copy. Do not permit erasures while attempting to reproduce the word. If the child attempts to erase, ask him to retrace the word with his finger and then to rewrite it.

4. Repeat the tracing and writing until the child is able to reproduce the word in his own handwriting at least once. Then present the regular "test size word card" with the smaller print and ask him to identify it.

5. Carry through steps "1" through "4" with all ten of the words.

6. Repeat procedure "1" hurriedly with all ten of the words.

7. If fifteen minutes have not elapsed since the lesson began, continue repeating the steps in the order listed above working with those words with which the child is experiencing difficulty, until exactly fifteen minutes have been spent on this lesson.

8. At the end of the fifteen minutes, administer the immediate recall test.

COMBINATION METHOD

The other methods (visual, auditory, and kinesthetic) are now combined into an eclectic method for our fourth procedure. Using a new set of ten "unknown" words, word recognition will be taught by giving equal stress to the visual, auditory, and kinesthetic approaches.

1. Present the ten picture-word cards to the child with picture-side up. Ask him to look at the picture, then at the word, and to say what it is. Do this with all ten of the cards. Have the child say the word several times while looking at the picture.

2. Present the initial sounds of the letters as you point to them. Also stress ending sounds. Ask the child to find words that rhyme with those listed, or words that begin or end like those listed. Ask the child to find any common phonograms or little-words-in-big-words. Repeat the ten words slowly as you stress the sounds as you point to them. Have the child repeat them after you.

3. Write the ten words on the blackboard or paper. Have the child trace over the words with his finger (the finger should always be in contact with the board or paper) saying the word part by part as he traces it.

4. While looking at the picture of the word (cover over the word) ask him to write the word. After he has written the word correctly, ask him to sound it out. Help him to stress the initial and ending sounds.

5. If fifteen minutes have not elapsed since the lesson began, repeat step "4" until exactly fifteen minutes have been spent on this lesson.

6. At the end of exactly fifteen minutes, administer the immediate recall test.

SCORING PROCEDURES

1. Record the number of right responses for delayed recall immediately after adminstration of each Set.

2. After all four Sets have been administered, add up the four delayed recall scores, and divide this total number of right responses by 4 to obtain the individual's mean score.

3. Subtract each delayed recall score from the mean score, indicating whether the score is in a plus or minus direction. In general, the further away from the mean particular method deviates in a plus direction, the more pronounced is this method best for this individual. If the method deviates in a minus direction, the less likely would this method be a successful one in teaching this particular child. See below for further aid in interpreting the variations of the four scores.

INTERPRETATION OF TEST RESULTS

In the studies made with this instrument to date, the LMT indicates that children show individual (and group) differences in the four teaching-learning situations in the

recognition of words. It should be pointed out here that much of the difficulty in the past in determining appropriate methods for the teaching of word recognition has come from confounding the particular reading skill of word recognition with general reading achievement which involves not only word recognition, but complex comprehension skills, generalizing, inferring meanings, etc. After all, phonics, the visual analysis of words, and kinesthetic tracings have been developed and used for the specific purpose of aiding the child in the identification and recognition of printed symbol. It is only after the child has a certain degree of competency in word recognition skills that he is able to read. That is to say, the act of reading is different from the act of identifying a word. As Dolch[2] might state it, the child has to have a certain number of "bricks" available before the "house" can take shape. It is the problem of ascertaining the best method in helping the child secure the greatest number of "bricks" (words) in the most efficient manner that is the concern of this test.

The Sample Test Record Form of "Jack Smith" on Page 29 of this Manual is from the file of an actual case. Jack made the following scores on the four methods:

METHOD USED	*IMMEDIATE RECALL*	*DELAYED RECALL*
Phonic	8	6
Kinesthetic	9	9
Visual	5	5
Combination	6	6

How can the above information be of help to the teacher in planning a remedial reading program for this retarded third grader? According to our standardization data, the Kinesthetic Method is significantly superior for "Jack Smith" to the other three methods. (It was found that the Delayed Recall Scores was a more stable index; therefore, the number of correct responses for Delayed Recall test became the criterion for determining the most efficient method.) Auditory and visual examinations were administered "Jack" with negative results. A check into the methods used by "Jack's" school teachers in reading indicated that the Visual approach had been utilized most of the time. Little or no training had ever been given "Jack" in the Kinesthetic approach with the exception of spelling lessons, yet it is this method that would appear to be the most effective in teaching this particular child word recognition.

That is not to say that the Visual and Phonic methods should not be used in working with "Jack." It is to say that the Kinesthetic approach should probably be given greater stress than the other two methods in this particular case if maximum effiiciency is to be realized.

SIGNIFICANCE OF THE DIFFERENCES IN THE SCORE

After you have administered the LMT, the child will have four delayed recall scores, one for each method. If all methods have been equally effective in teaching the child, then all the scores would have been the same. In actual practice, there are generally variations in the four scores and some method of determining when these variations are of significance had to be developed. Seventy-five subjects were used to obtain data to formulate a method of interpreting the significance of these scores.[7] A frequency distribution was made of the 300 deviation scores of these 75 subjects and the mean deviation score was obtained. These deviation scores ranged from +4.0 to —4.8 with a mean of 0. From this data, the standard deviation of these scores was computed. This resulted in the following conclusion:

For ease in interpretation, we can conclude that if one or more of a child's scores deviates in either direction by more than 1.5 from his own mean, this is a greater deviation than we would find in approximately 68 per cent of the cases and would probably be of clinical significance even though it is not statistically significant. If one or more of an individual's scores deviates as much as 3.0 from his own mean, this is a greater deviation than occurs in approximately 95 percent of the cases and would be of statistical as well as clinical significance.

Referring again to the Sample Test Record Form of "Jack Smith," we find that the average for the four delayed recall scores is 6.5. Since the Kinesthetic Method received a score of 9.0, this is 2.5 more than Jack's own mean, and hence would be highly significant over the other three methods.

You will find some individuals whose score patterns are not differentiating. This means that with some children there appears to be very little difference in word recognition learning efficiency regardless of the method used. (This is especially true of the higher intelligence group.) In such cases, if would probably be better to use a combination approach for the teaching, at least, until such time as one method seems to emerge as superior.

VALIDITY

The LMT is actually a measure of a child's proficiency in the task of learning to recognize words under various teaching procedures. Since this is the ultimate criterion for which the test is designed, the instrument possesses what is termed "content" or "Work-sample" validity.[12] The only type of validity study of any significance that could be made with the LMT would be a longitudinal validation study consisting of clinical case studies over long periods of time. Several cases have been completed by various teachers and clinicians but the number of such studies is too small to be of statistical significance or to warrant generalizations. Authorities in test construction generally agree that content validity, as is inherent in the LMT, is an acceptable form of validity.

The test items, i.e., the picture word cards, were drawn from frequency studies of word use from 104 representative school systems throughout the United States.[6] It would therefore seem that the test items have been selected from as valid a sampling universe as needed for the purpose of the test.

The usability of the test in clinical situations, another test of validity,[12] has been successfully demonstrated in more than one hundred clinics and school centers throughout the United States.

RELIABILITY

To determine the reliability of the LMT, thirty subjects were re-tested using the "equivalence of forms" technique. Items for the equivalent form were selected on the same basis as the initial forty items in the pretest process described earlier. All items for both forms were from the same grade level of difficulty.

The interval of time between test and retest ranged from one to twenty-five weeks with a mean interval of 13.4 weeks and a median interval of 13.5 weeks. The intelligence quotients for these thirty subjects as measured by the *Weschler Intelligence Scale for Children* ranged from 64 to 115. The mean intelligence quotient was 90.1; the median was 90.5. All subjects were drawn from the public schools of Central Florida.

Reliability coefficients were obtained on all four methods by correlating the number of right responses for delayed recall for the same method on Form B. The reliability coefficients reported below were obtained by using the product-moment coefficient of correlation techniques.

LEARNING METHODS	*COEFFICIENT OF CORRELATION*
Visual	.969
Phonic	.970
Kinesthetic	.908
Combination	.954

From the foregoing, it would appear that the LMT is highly reliable. It should be noted, however, that no inter-examiner reliability study has been made. The author administered all the tests, teaching procedures, and retests in the reliability study reported above.

SUMMARY OF RESEARCH FINDINGS ON THE LMT

An analysis of variance and subsequent $\underline{t}$ tests were the statistical techniques employed with 58 subjects by the author to arrive at the following conclusions.[7]

1. Difference in Sex. Matched pairs of boys and girls, equated as to age and intelligence, indicated that the observed differences between the scores of boys and girls were not signficent for any of the four methods. There was a tendency, however, for girls to learn to recognize words more efficiently than boys for all four methods.

2. Children of low intelligence. The phonic method was least effective for this group of children. On the other hand, the kinesthetic method proved to be the best method in a great number of cases but it was not statistically better than the visual and combination methods.

3. Children of average intelligence. The kinesthetic method is the least effective for this group of all the teaching methods studied. The phonic method showed no statistical significance in either direction. Combination and visual methods proved to be about equally good for this group of children.

4. Children of high intelligence. In this group, we were restricted in any conclusions because all subjects tended to learn words readily regardless of the teaching method used. The visual method, however, seemed superior to the kinesthetic method.

5. Seven year olds. The visual method appeared best and the kinesthetic method appeared the poorest for this age group. The other two methods were neither consistently effective nor ineffective in working with this group.

6. Eight year olds. For this group, the kinesthetic method proved best; it was significantly better than the phonic and somewhat better than the other two. This finding might have some possible relationship to the fact that eight year olds are usually just becoming proficient in writing and show a great deal of interest in related activities.

7. Nine year olds. No one of the four methods was outstandingly effective or ineffective for this group. The visual method did tend to be better than the kinesthetic.

In general, the higher the intelligence, the more readily children learn words. This finding was certainly in keeping with results to be expected from this type of study. However, there was no consistent relationship between age and a child's readiness to learn words for the three age groups studied. This finding has implications for present school practices where chronological age is all too often used as the major criterion in deciding when a child is ready to learn words.

In summary, this study showed conclusively (at the 1% 1. o.c.) that different children learn to recognize words more efficiently by different teaching methods and that no one method is best for all children. This study, as well as other studies made by different individuals employing LMT, indicates the need to get away from the concept of "a best method" for teaching all children and to concentrate instead on finding out *which* method is best for *which* children. It is believed that the Learning Methods Test affords such an approach.

A Request to Teachers and Clinicians:

In order that this Learning Methods Test might be developed into a better diagnostic instrument, a request is made of those who use it to aid in the collection of pertinent test data. Also your criticisms and comments regarding the structure, scoring, interpretation, Manual of Directions, etc., would be greatly appreciated. Please forward any test data, criticisms, and comments to the author.

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APPENDIX B

GATES-MACGINITIE READING TESTS

Primary A, Form 1

t your
e here ....

old are you? ....

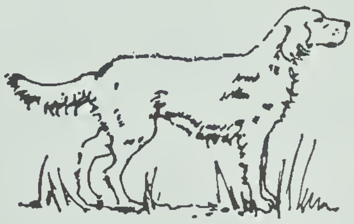
en is your birthday? ....

de ....Date ....

ool .... Teacher ....

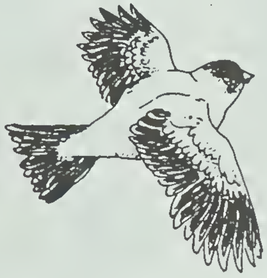
VOCABULARY SAMPLES

A.



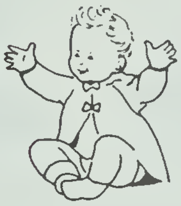
did	egg
dog	two

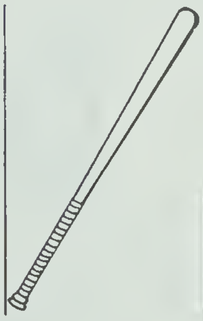
B.



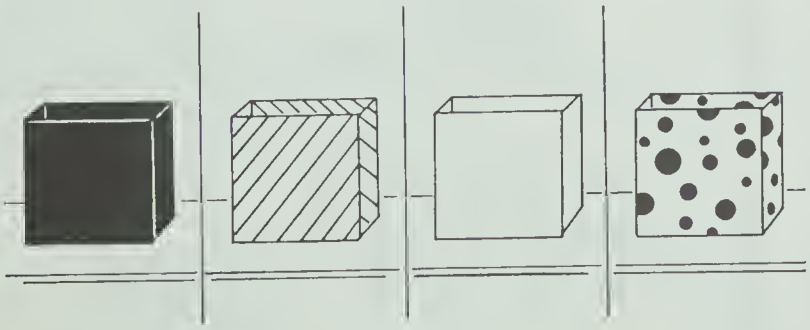
bed	swim
milk	fly

COMPREHENSION SAMPLES





A. Where is the baby?



B. The white box is on the shelf.

A
FORM 1

GATES–
MacGINITIE
READING TESTS

PRIMARY A, FORM 1

Vocabulary and Comprehension

■☐☐☐☐☐☐☐☐☐☐☐

TEACHERS COLLEGE PRESS
TEACHERS COLLEGE
COLUMBIA UNIVERSITY
NEW YORK

To the Teacher:

BE SURE to follow the directions in the Manual (included in each test package) when giving these tests. The directions will tell you how to explain the tests and how to work the sample items with the students. Allow the exact time specified in the Manual.

VOCABULARY

Number correct ______________

Standard score ______________

Percentile score ______________

Grade score ______________

COMPREHENSION

Number correct ______________

Standard score ______________

Percentile score ______________

Grade score ______________

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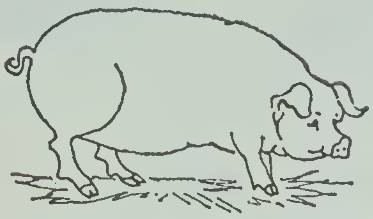
Printed in U.S.A.
10 9 8 7 6 5 4 3 2

START HERE

Vocabulary

1.



all pig

eye fly

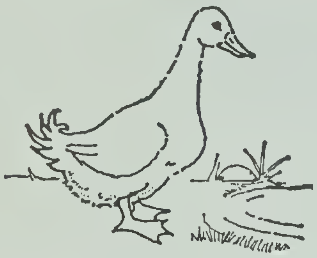
2.

4

foot soup

door four

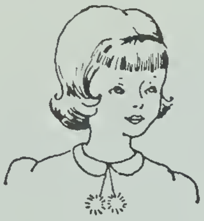
3.



duck fish

face rock

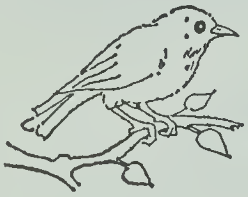
4.



made ball

girl cent

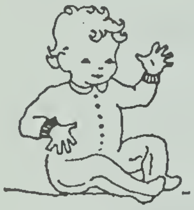
5.



bird bring

fire hard

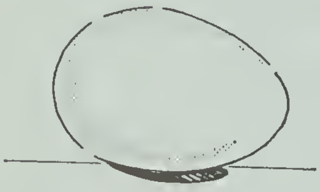
6.



made ball

play baby

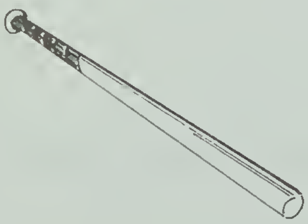
7.



had egg

eat not

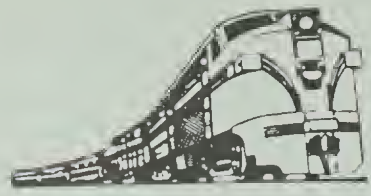
8.



boy cow

arm bat

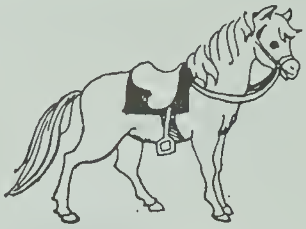
9.



tree draw

again train

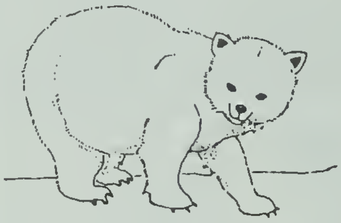
10.



pair puppy

pony money

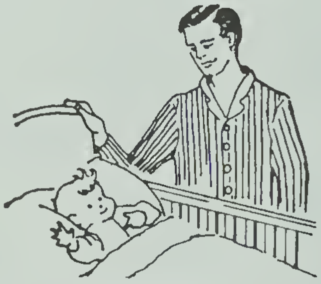
11.



bell bear

star read

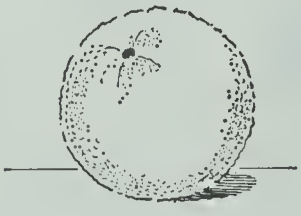
12.



father matches

fanning winter

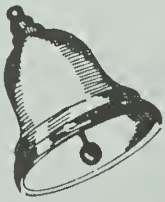
13.



oven oxen

orange change

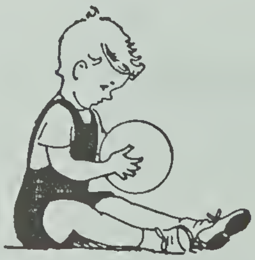
14.



help will

been bell

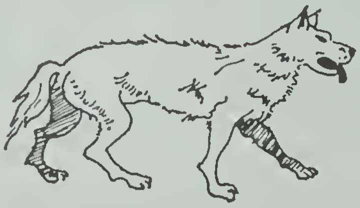
15.



say out

pig sit

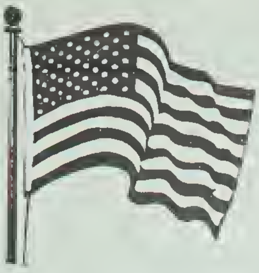
16.



wolf talk

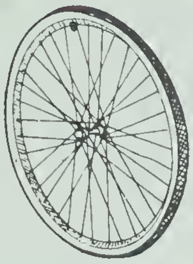
work wood

7.



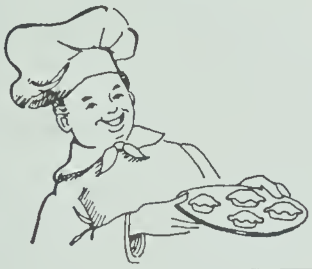
frog flag
floor clap

8.



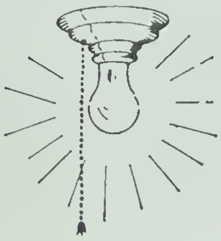
wheel wheat
what smell

9.



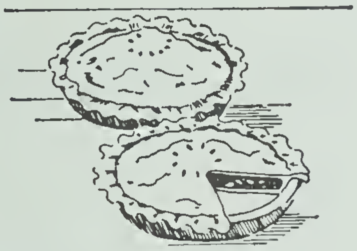
cook took
roof clock

20.



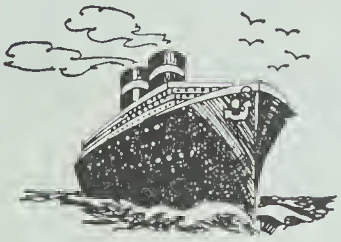
fight lost
light lifts

21.



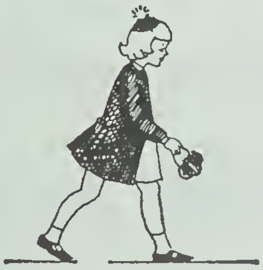
pies rock
pick pink

22.



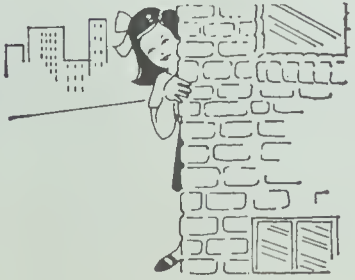
lip stop
ship shoe

23.



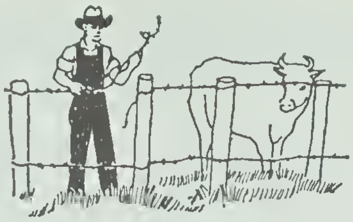
liking walking
wanting talked

24.



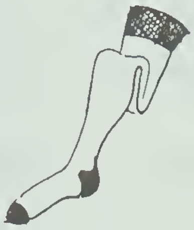
ride hide
hill made

25.



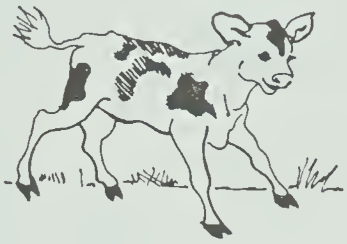
forty warmer
farmer falling

26.



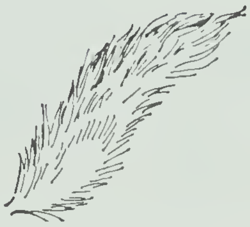
stocking standing
splash something

27.



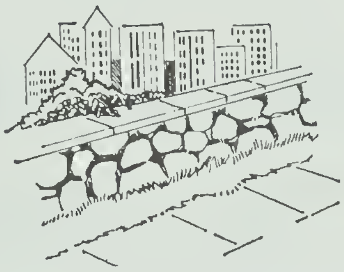
hall call
cart calf

28.



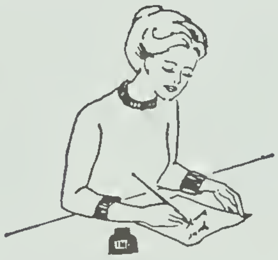
wolf tail
take ship

29.



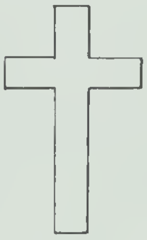
wall want
talk roll

30.



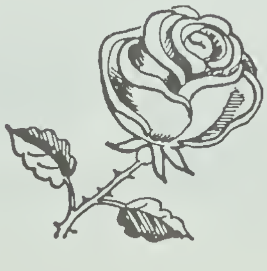
bite wishes
wing write

31.



grass cross
loss crow

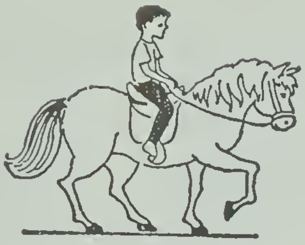
32.



rock rope
hose rose

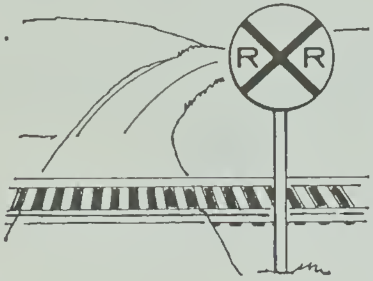
TURN THE PAGE

33.



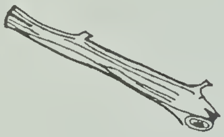
raining	river
riding	hiding

34.



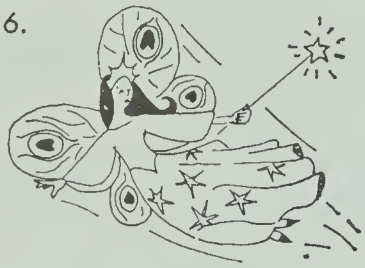
railroad	railing
rib roast	rainbow

35.



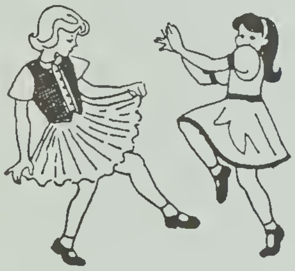
shake	late
stick	skate

36.



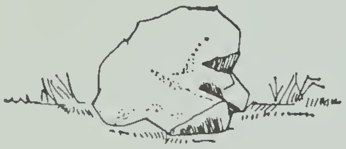
family	fair
pairs	fairy

37.



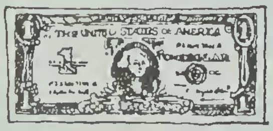
dance	daisy
prince	down

38.



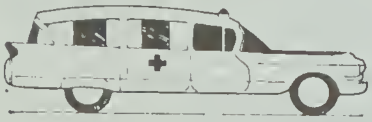
stone	stand
stay	alone

39.



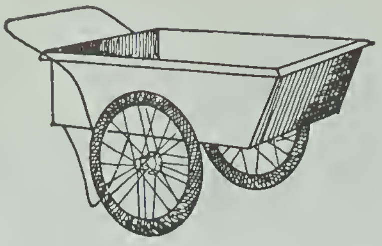
doctor	dollar
donkey	dolly

40.



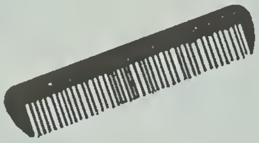
ambulance	American
adventure	astronaut

41.



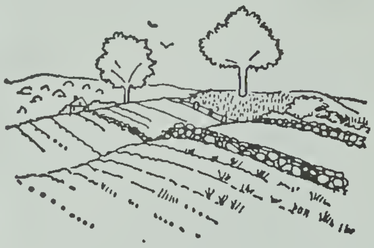
card	can’
part	car

42.



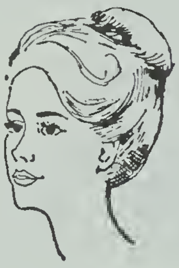
lamb	camp
comb	come

43.



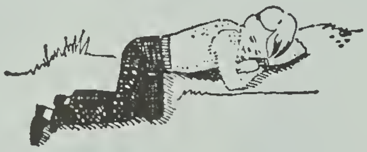
hand	land
fans	lays

44.



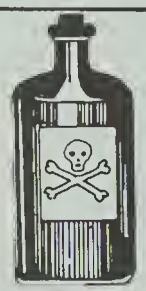
fans	back
mice	face

45.



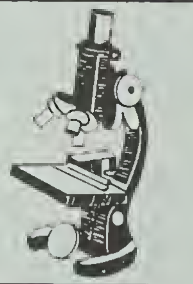
fix	lip
lie	tie

46.



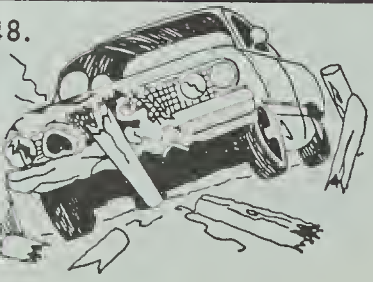
point	prison
poison	drown

47.



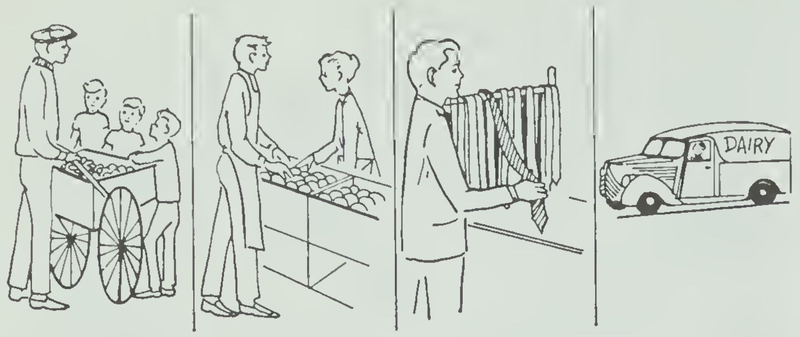
neighbor	migration
mosquito	microscope

48.

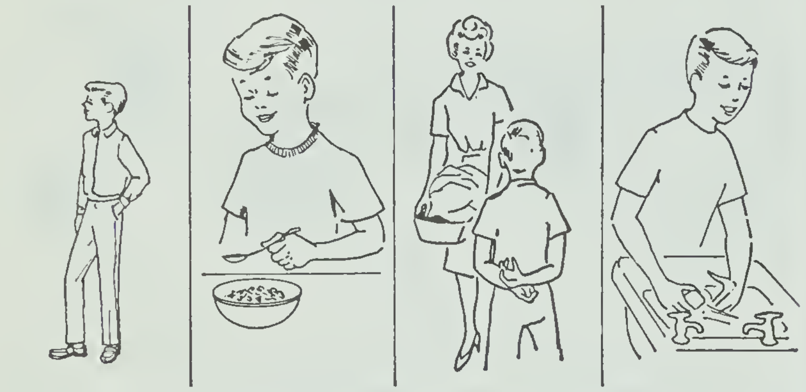


accept	accident
addition	sandwich

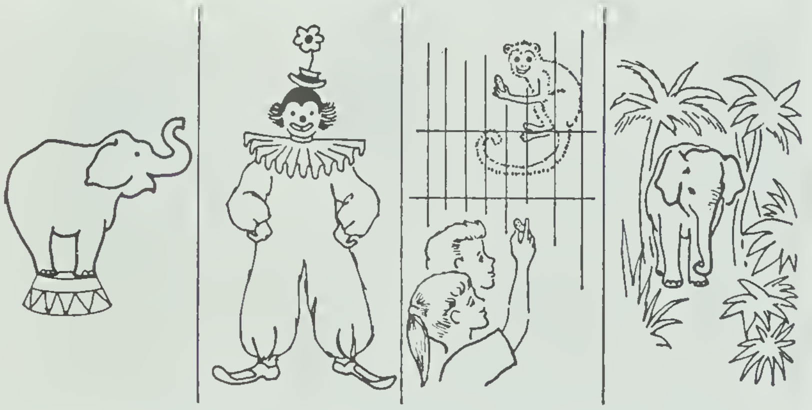
STOP



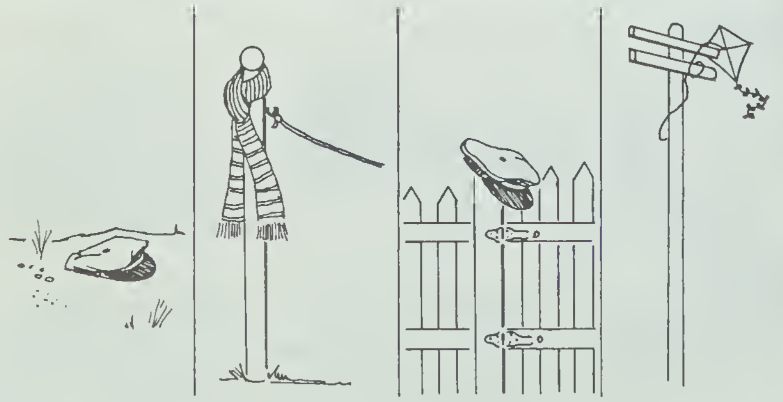
27. Every fine day Mr. Blake brought his cart to the corner. He sold peanuts and popcorn. After school, the boys often stopped to buy something. They often stayed for awhile to talk to Mr. Blake.



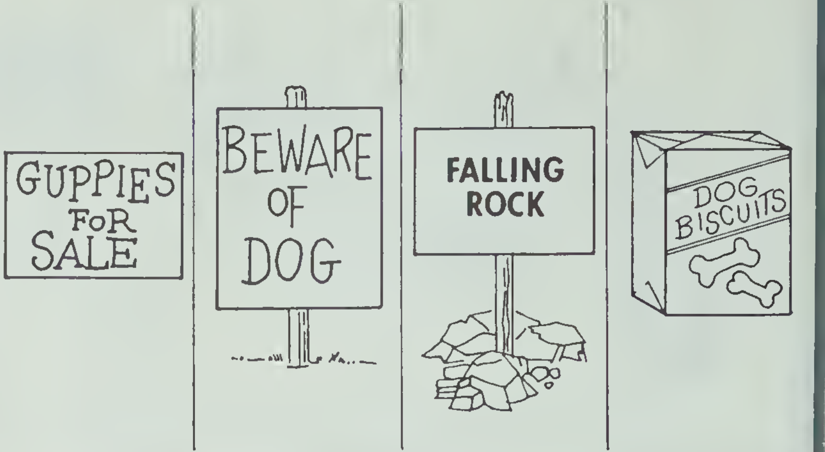
28. "Always wash your hands before eating," said Mother. One boy is doing what his mother told him to do.



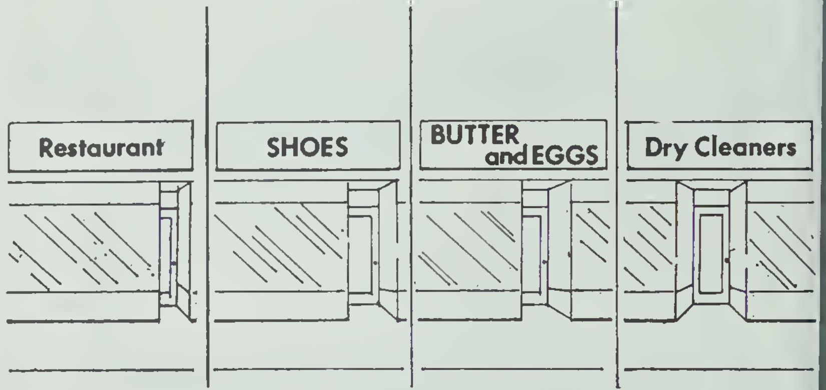
29. This elephant is in a circus. He does funny things to make the children laugh. The children give him peanuts.



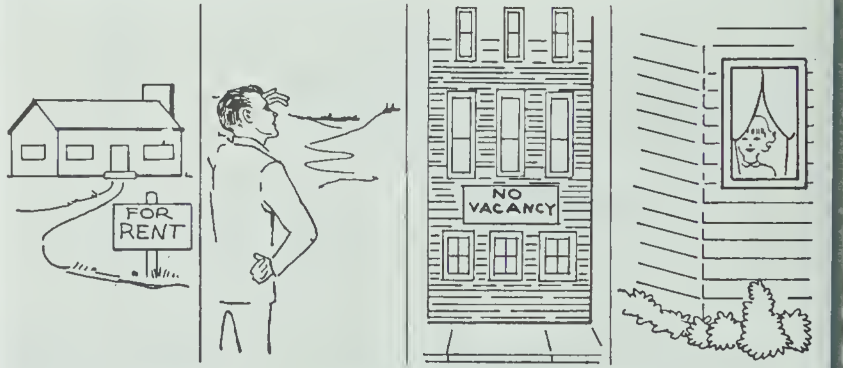
30. The strong wind during the storm had blown his new cap off the line. There it was on the gate post.



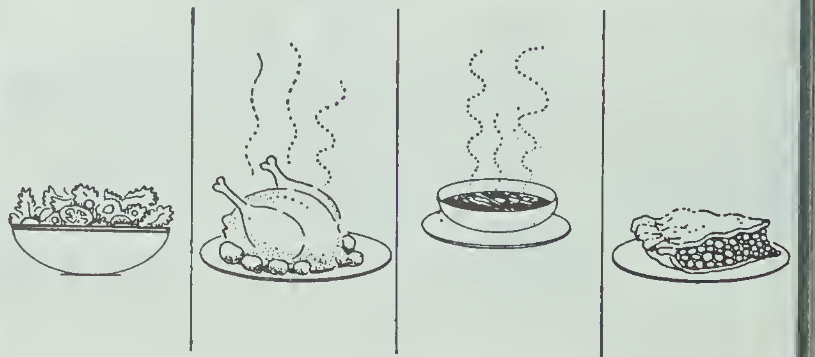
31. Which shows a sign that tells you to watc
out for an animal?



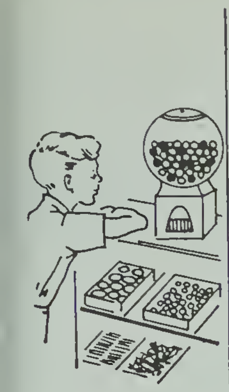
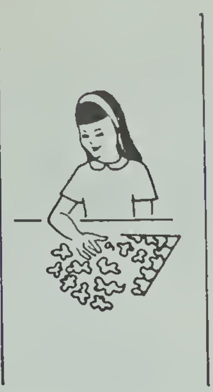
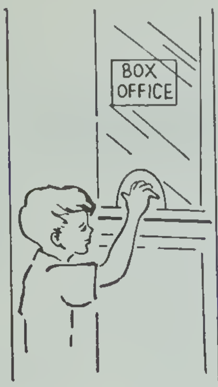
32. Father should have his coat cleaned. H
dropped some butter on it when he was eatin
Where does Father need to go?

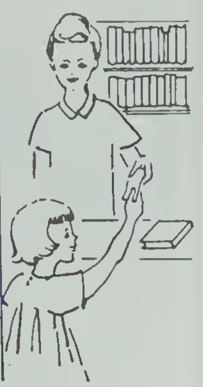


33. A man was looking for a house to live i
He passed many houses. Then he saw one whic
he might rent. He went into this house. Whic
house did he go into?

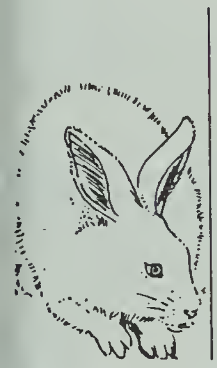
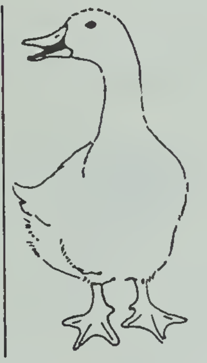
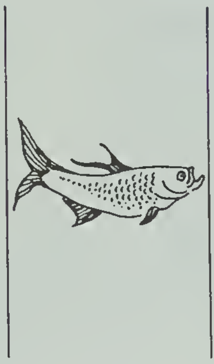
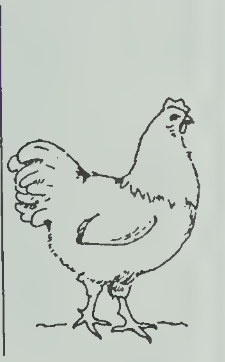


34. We had a big Thanksgiving dinner. Fi
came soup and then turkey with vegetables. La
came pie and cheese. What was the first thi
we ate?

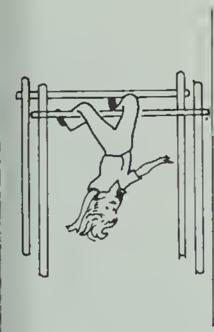
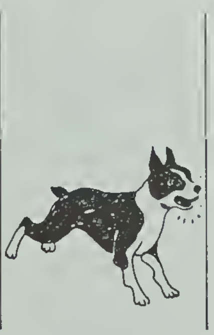
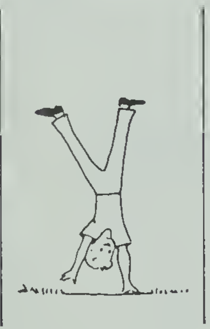
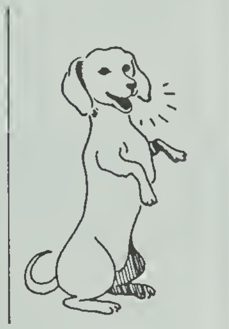






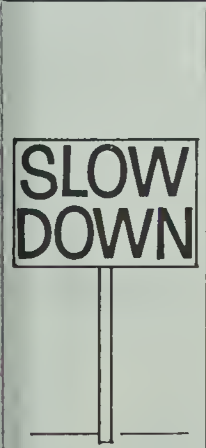
19. This boy is buying tickets to a movie.

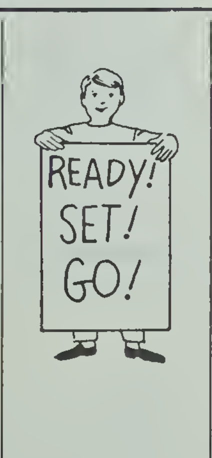
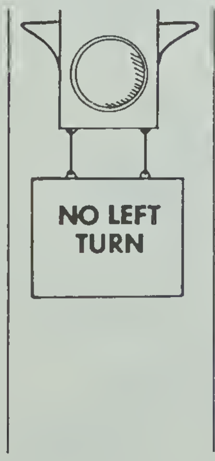





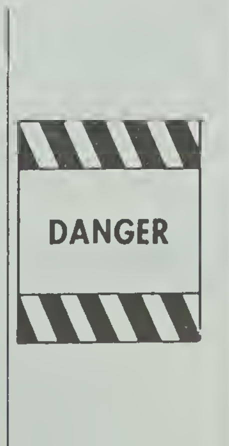
20. The rabbit and the hen live on land. The ish lives in the water. The duck lives near the vater. Which picture shows what lives in the vater?

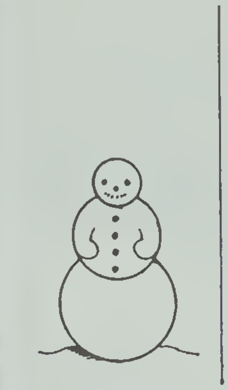
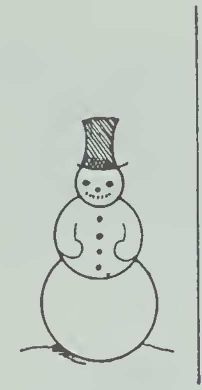
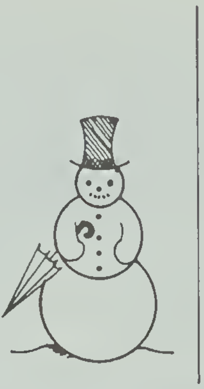
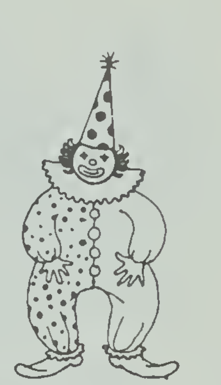
21. The dog that lives next door has learned everal tricks. His latest trick is to sit up on his wo hind legs and bark when he wants something o eat. Which trick has he just learned to do?



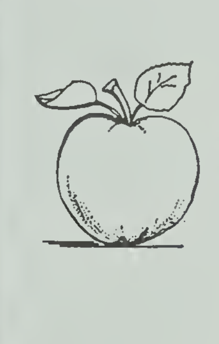
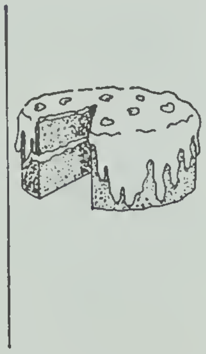
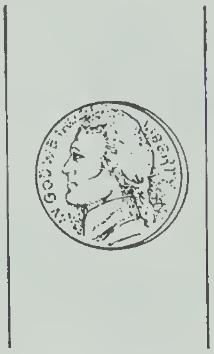
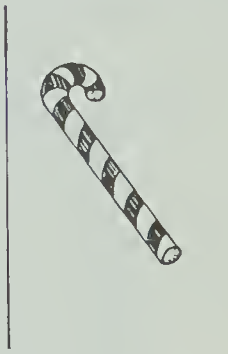

READY! SET! GO!




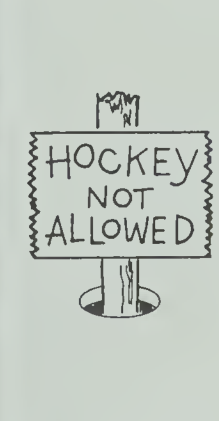
2. Mark the sign that means you should not urn left.

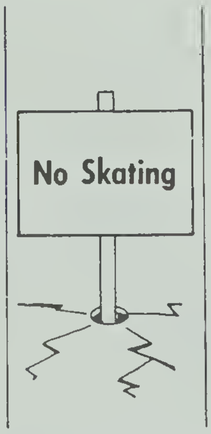





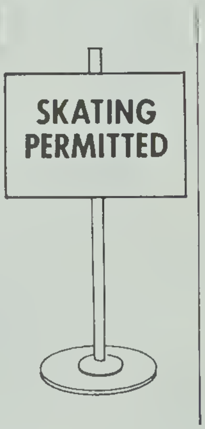
23. The snowman that lasted longest was the one that Jack made. It had four buttons, an umbrella, and a tall black hat.

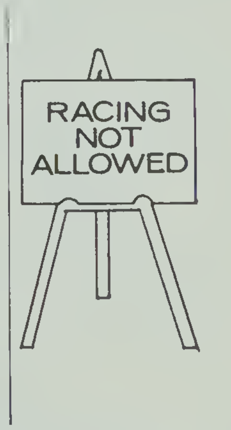





24. A boy had five cents. He went to buy some candy. On the way to the store he saw some big apples for sale. He got an apple. What did the boy get with his money?

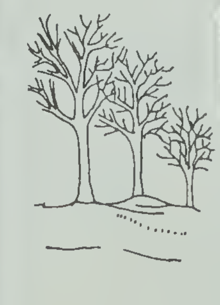
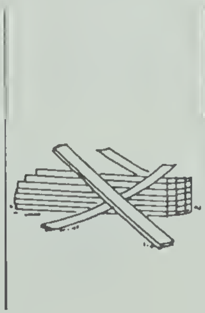
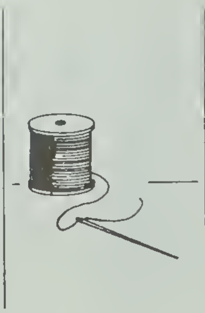
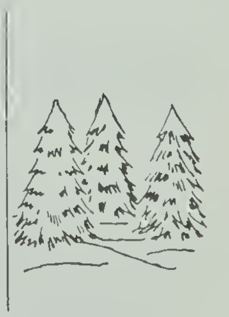




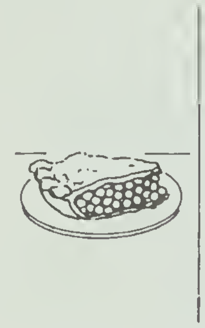
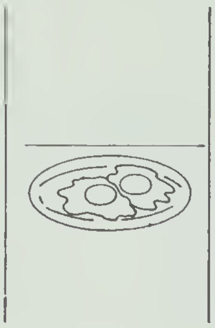
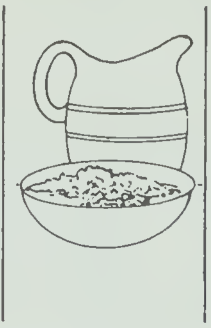
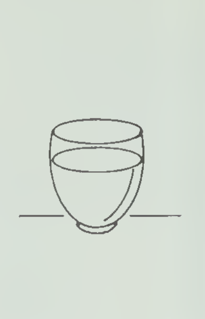




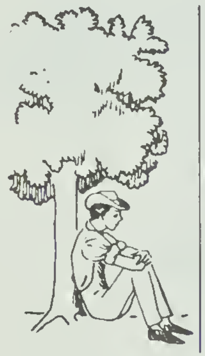
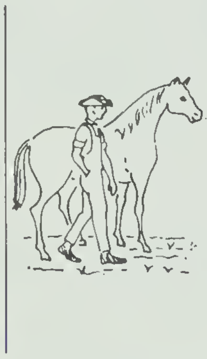
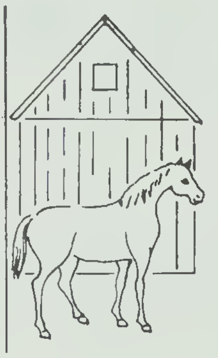
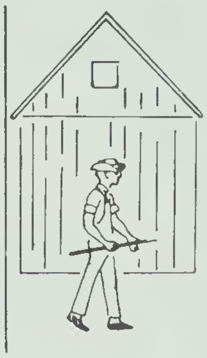
25. Which sign means that skating is not allowed?

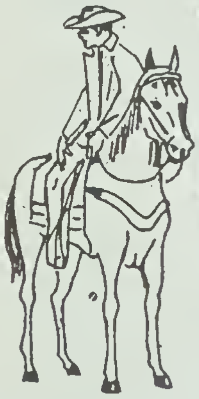
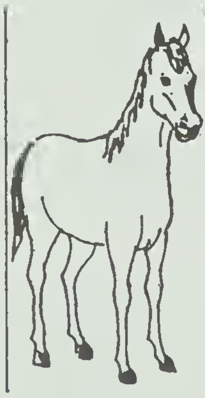
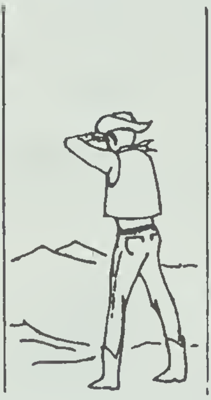
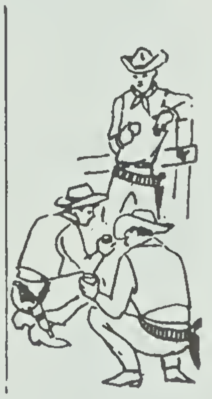
26. Firs, pines, and spruces are called evergreens because their needles stay green all year. These evergreen trees make good Christmas trees. They keep fresh for a long time after they have been cut.

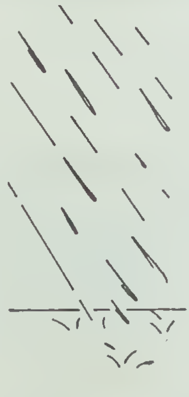
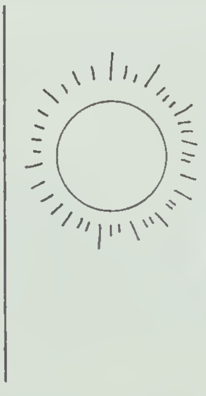
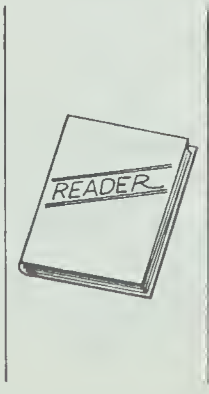
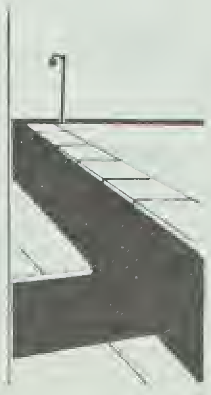
11. For breakfast he wanted a couple of fried eggs.

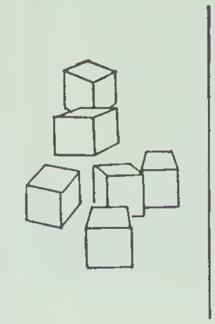
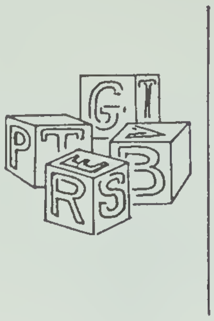
12. The farmer is walking near his barn.

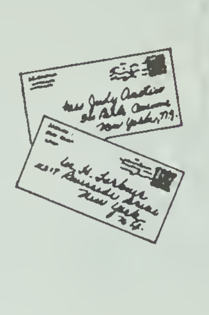
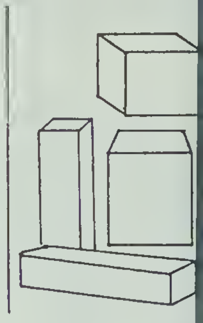





13. This cowboy has lost his horse.

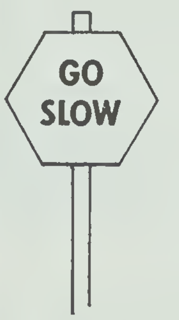





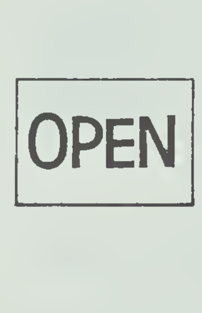
14. What will make the streets wet?

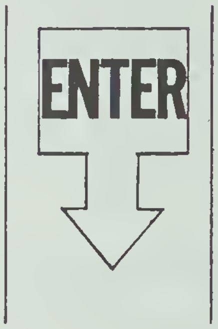



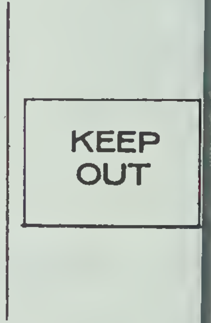



15. These blocks have letters on them.

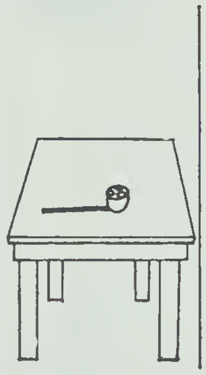
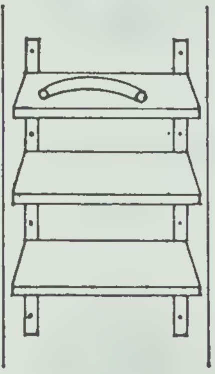
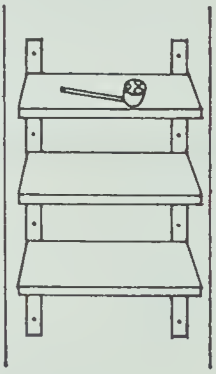
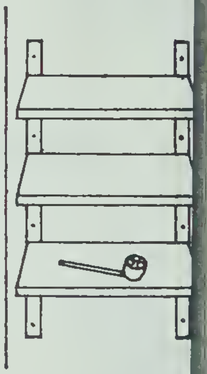




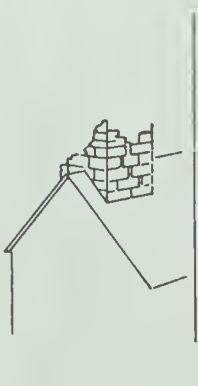
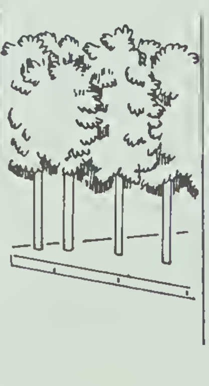
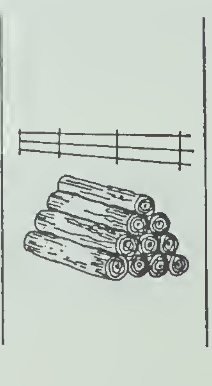
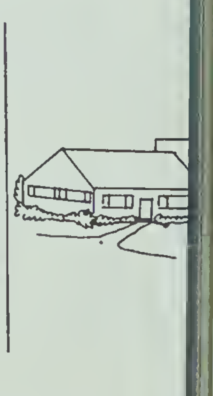




16. Mark the picture of the sign that tells y
not to go in.

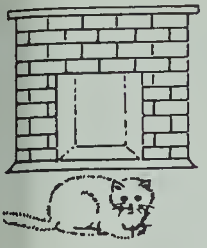
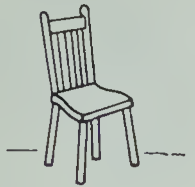
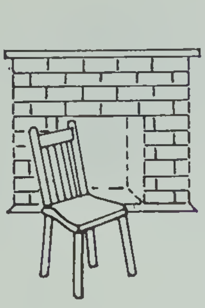
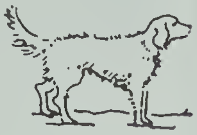
17. His best bubble pipe was on the top shel

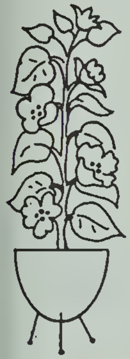
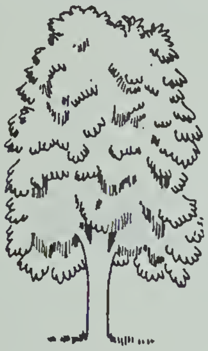
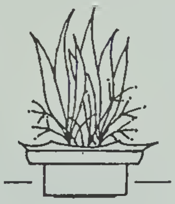
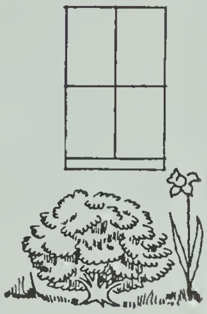
18. A strong wind caused damage to t
chimney of our house.

Comprehension

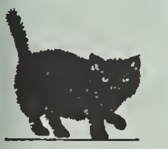
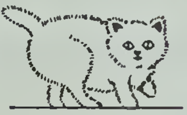
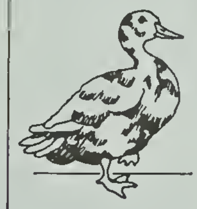
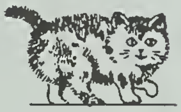
START HERE

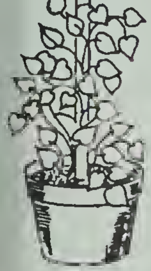
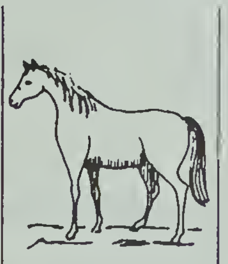
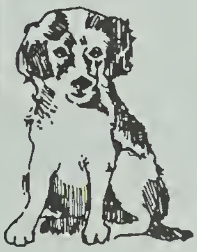
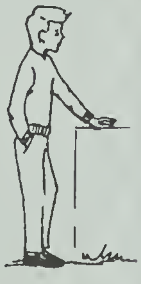
1. Mark the cat.

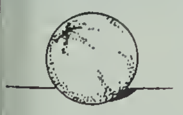
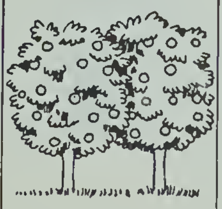
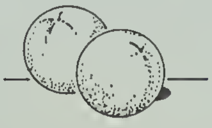
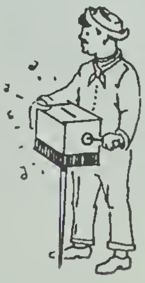
2. Which is the big tree?

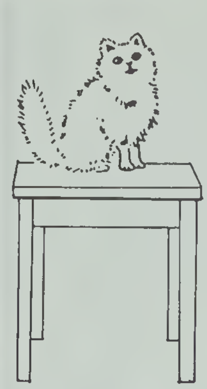
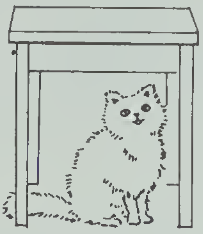
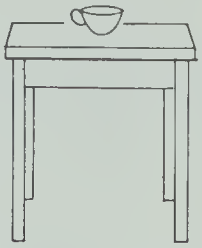
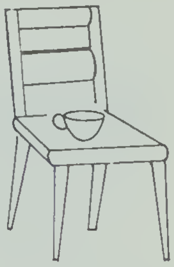
3. Here is the white kitten.

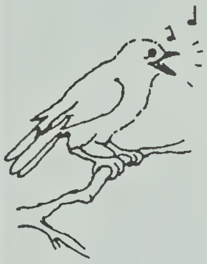
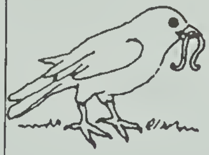
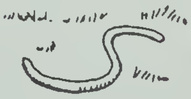
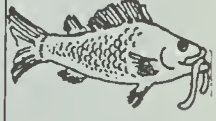
4. This is a boy.

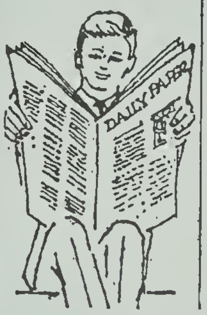
5. Here are two oranges.

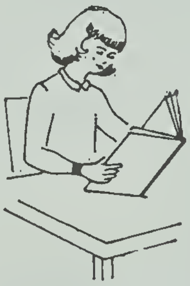
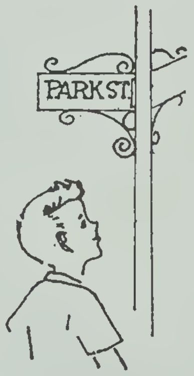





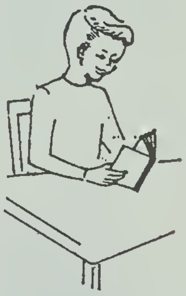
6. The cat is sitting on the table.

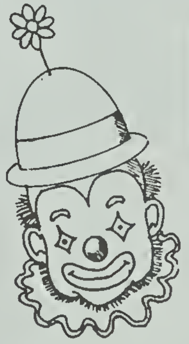
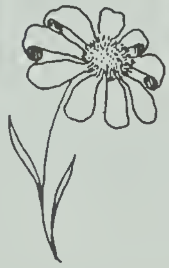
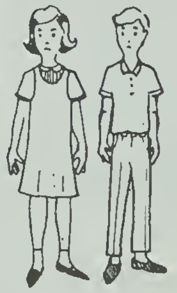
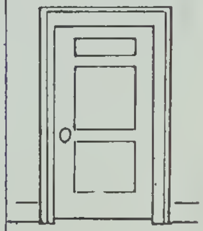
7. Mark the bird with a worm.



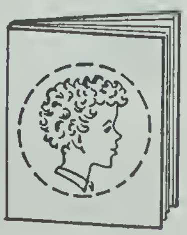
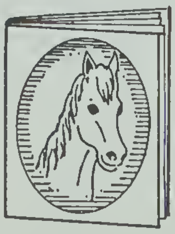
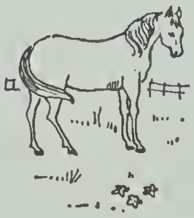
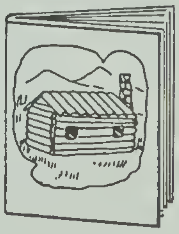





8. Who is reading from a little book?

9. What made the children laugh so hard?

10. The book she wanted was about horses.

TURN THE PAGE

APPENDIX C

GATES-MACGINITIE READING TESTS

Primary A, Form 2

nt your
me here ....

w old are you? ....

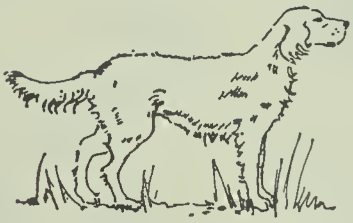
hen is your birthday? ....

ade ....Date ....

hool .... Teacher ....

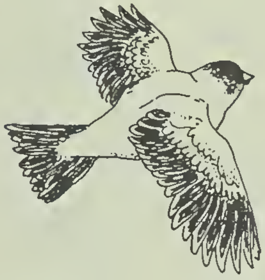
VOCABULARY SAMPLES

A.



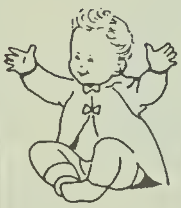
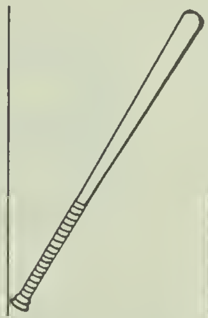
did	egg
dog	two

B.

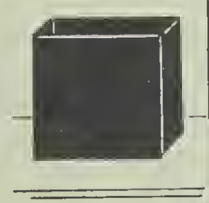
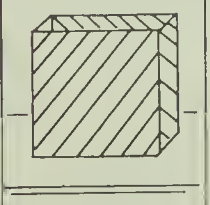
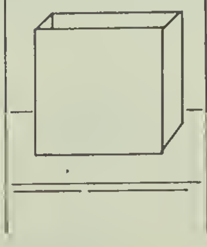
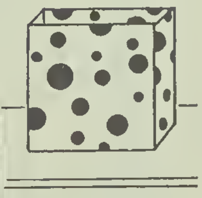


bed	swim
milk	fly

COMPREHENSION SAMPLES

A. Where is the baby?

B. The white box is on the shelf.

A
FORM 2

GATES–
MacGINITIE
READING TESTS

PRIMARY A, FORM 2

Vocabulary and Comprehension

TEACHERS COLLEGE PRESS
TEACHERS COLLEGE
COLUMBIA UNIVERSITY
NEW YORK

To the Teacher:

BE SURE to follow the directions in the Manual (included in each test package) when giving these tests. The directions will tell you how to explain the tests and how to work the sample items with the students. Allow the exact time specified in the Manual.

VOCABULARY

Number correct ____________

Standard score ____________

Percentile score ____________

Grade score ____________

COMPREHENSION

Number correct ____________

Standard score ____________

Percentile score ____________

Grade score ____________

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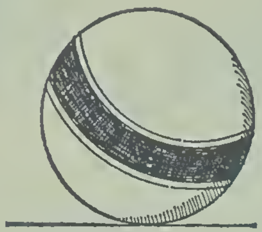
START HERE

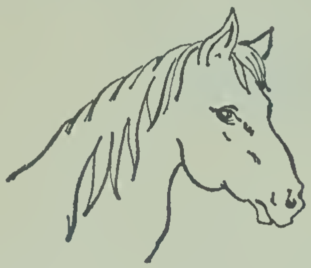
Vocabulary

1.



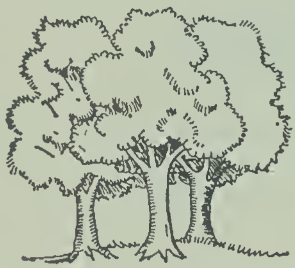
ball duck
drum ears

2.



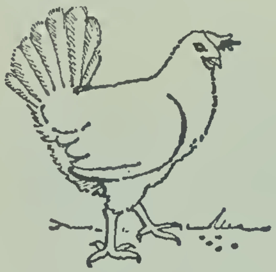
ring home
horse shoe

3.



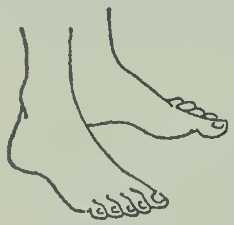
keep sleds
sleep trees

4.



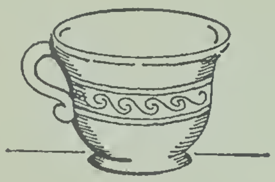
hen has
pan get

5.



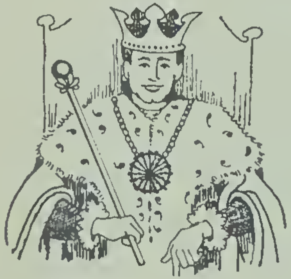
feet city
doll fire

6.



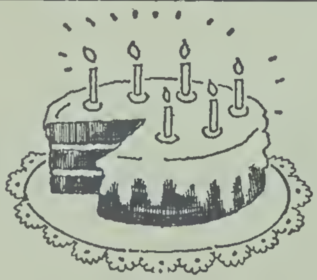
hay fox
end cup

7.



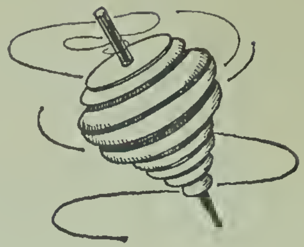
king song
kite find

8.



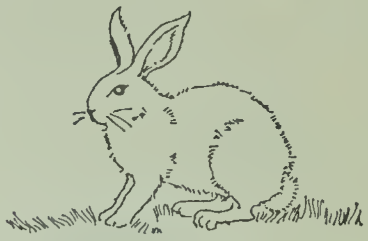
call walk
back cake

9.



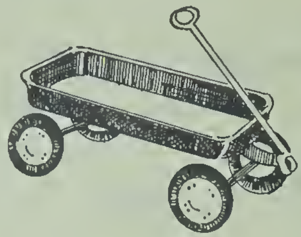
top try
hot cap

10.



right rabbit
robin rather

11.



waves wigwam
pigeon wagon

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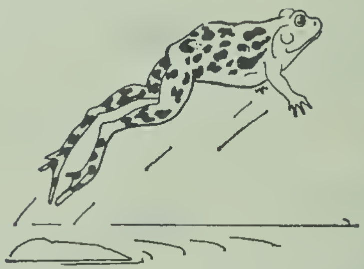

drop from
frog flag

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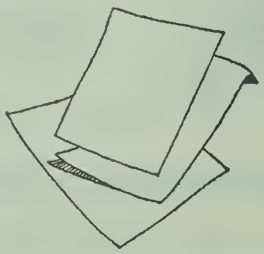

paper paint
dress robin

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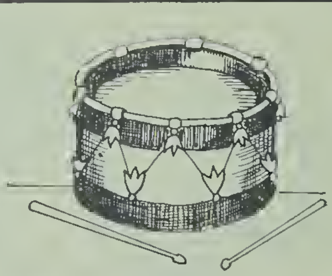

there draw
drum grass

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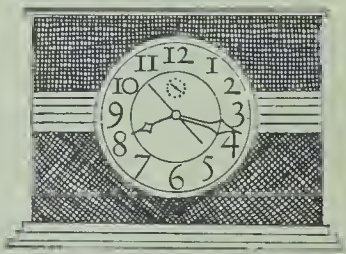
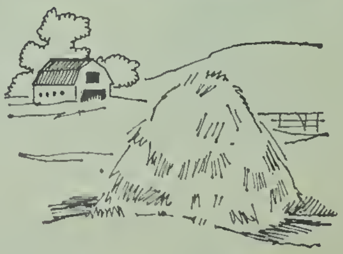


clean chalk
block clock

16.



hay how
fan toy

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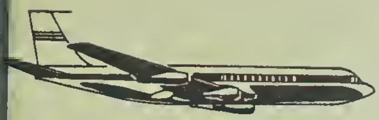

airplane automobile

although airfield

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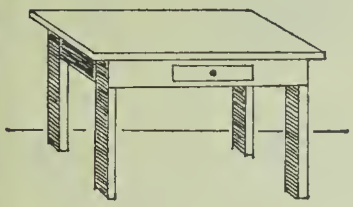
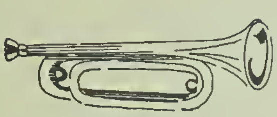


water table

takes little

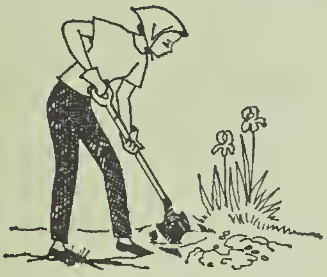
9.



horn corn

hour word

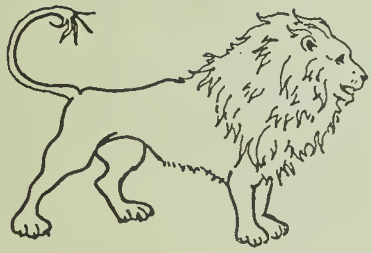
20.



are dig

hen not

21.



lion line

like tone

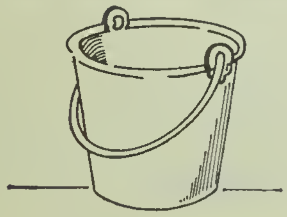
22.

12

town throw

twelve crow

23.



pair pail

mail pull

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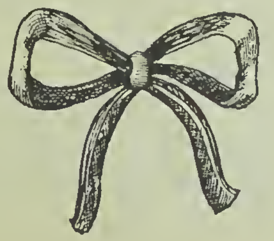
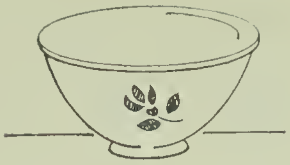


buy fox

bow new

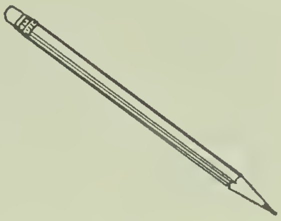
25.



digs dish

miss wish

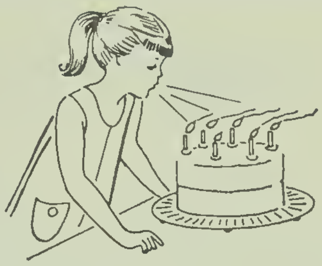
26.



pupil penny

peanut pencil

27.



brown blow

bow slow

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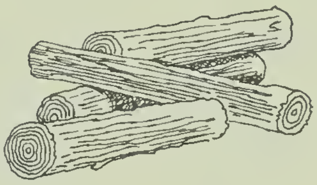

wore wood

fork word

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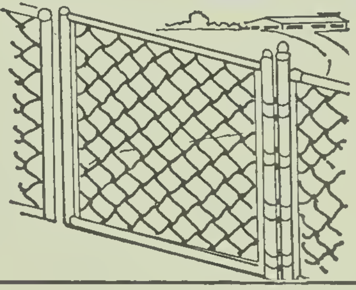
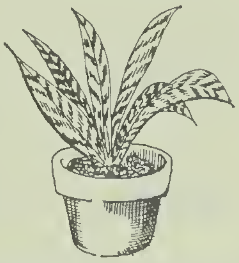


garden grow

wash gate

30.



watch paint

plant house

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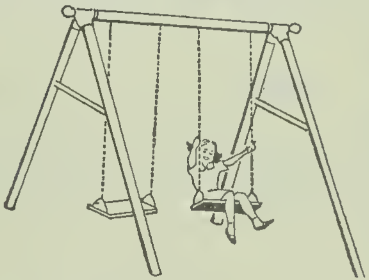

wing sting

swing swim

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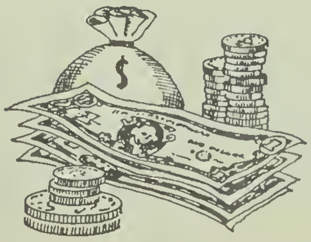
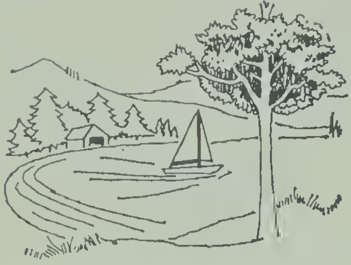


monkey name

money mouse

TURN THE PAGE

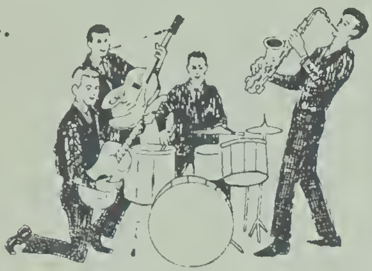
33.



last take

like lake

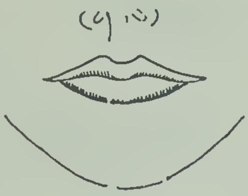
34.



band hand

bank bark

35.



march south

mouth month

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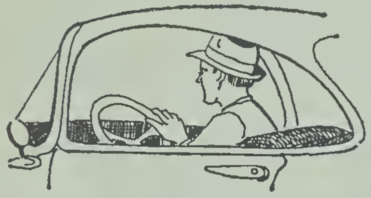

drive dirty

live divide

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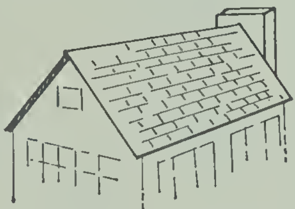
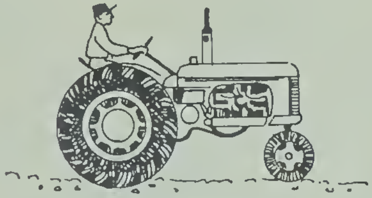


took roof

room root

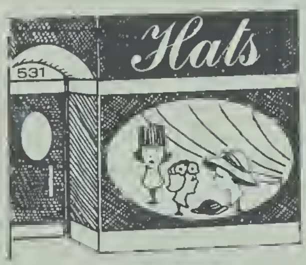
38.



traffic tractor

ticket practice

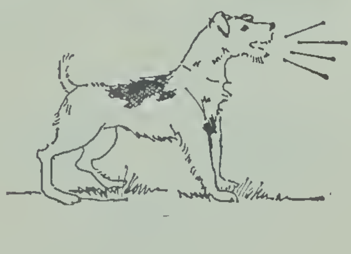
39.



drop shot

shop stop

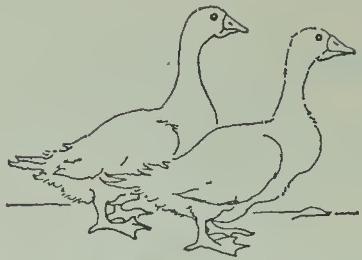
40.



dark bark

bank barn

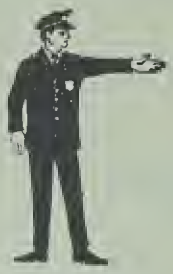
41.



geese gras

cheese gues

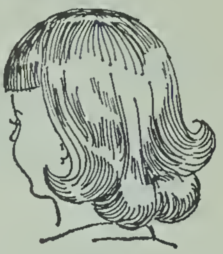
42.



polish poun

porch polic

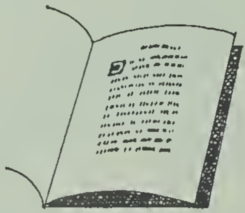
43.



hear sai

hair pai

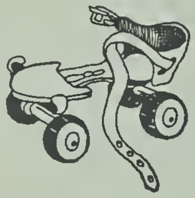
44.



park papa

cage page

45.



skips gate

skate state

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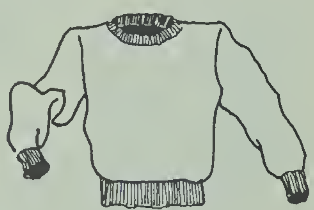
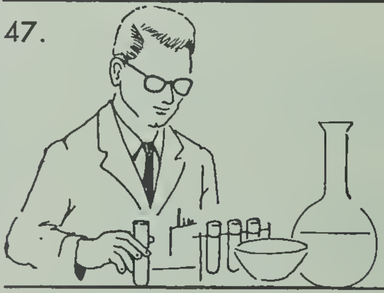


sweet sweater

swallow sister

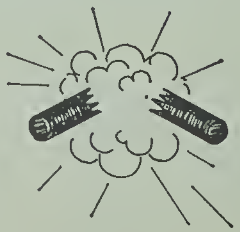
47.



sickness twist

scissors scientist

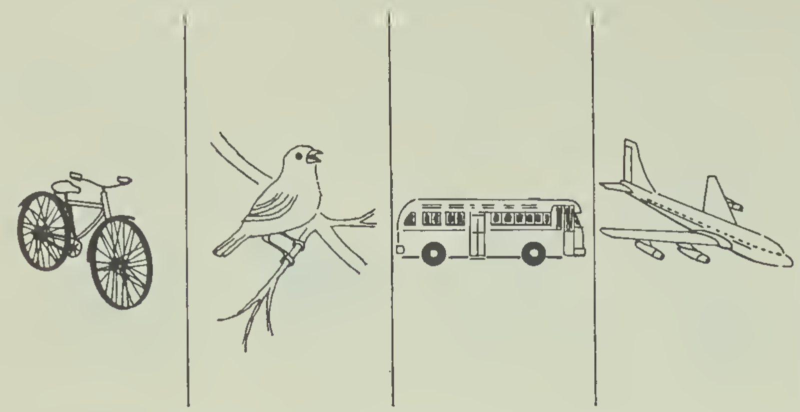
48



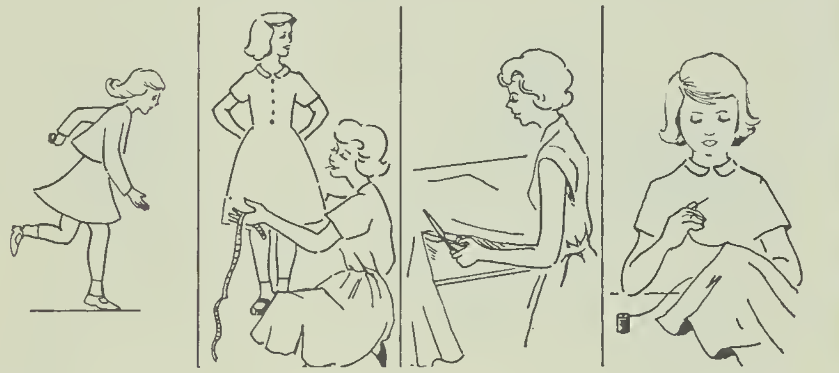
brass blast

plaster bleat

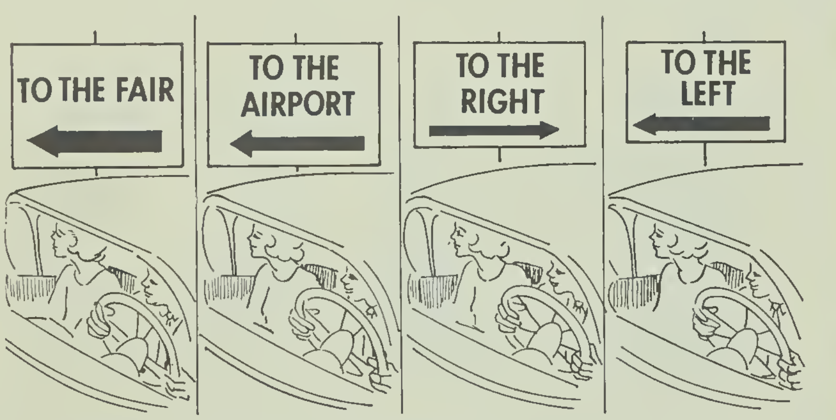
STOP



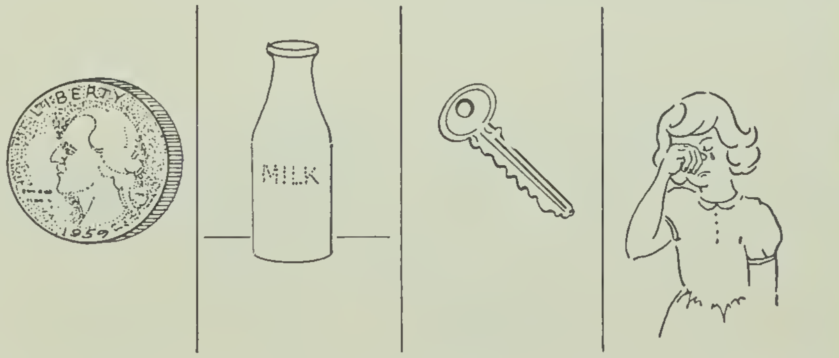
27. It looks like a great silver bird. Johnny knows it is flying very fast through the air. Which one is it?



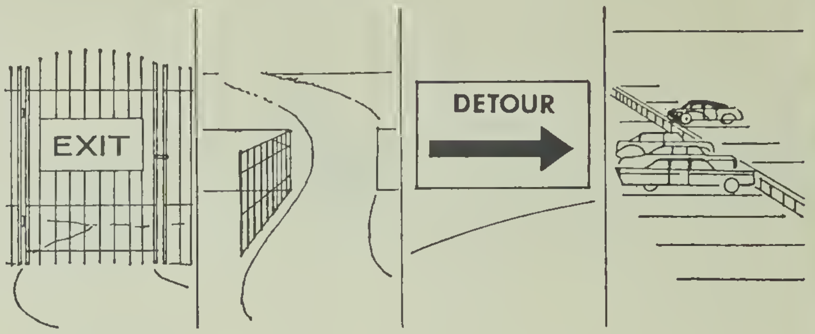
28. Mother is making a new dress for Kathy. It is almost finished. She is measuring the length of the dress, and Kathy is standing very still so it will be straight.



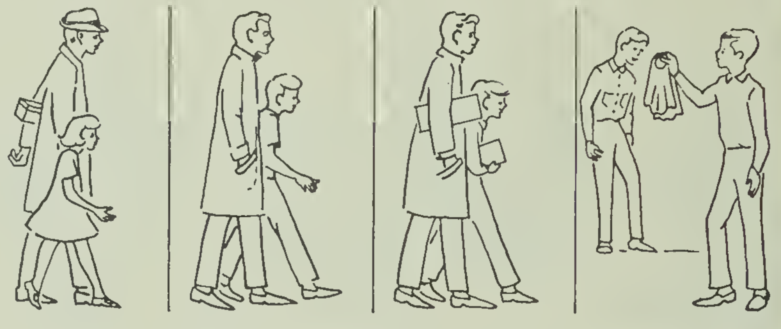
29. They wanted to find the road to the fair. As soon as they read the sign, they knew that they were on the right road.



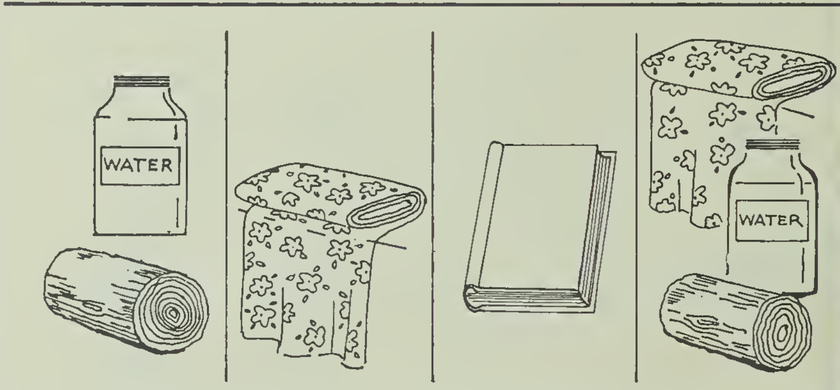
30. A little girl was crying. "Why are you crying?" asked a woman. "I lost the money my mother gave me to buy milk," she said. What did the little girl lose?



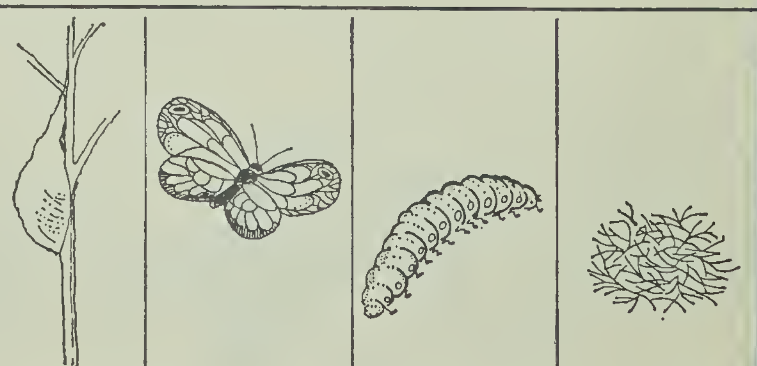
31. They knew that they were going the right way because the gate was wide open.



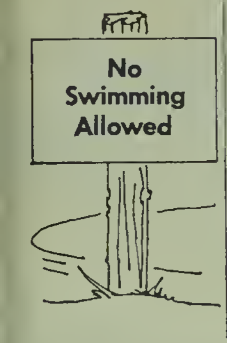
32. John's father took him to the shoe store fo new shoes. When the shoe salesman saw wher John's shoes were worn out, he brought out tw different boxes. John got his wish—new schoo shoes and new football shoes.

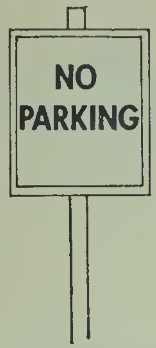


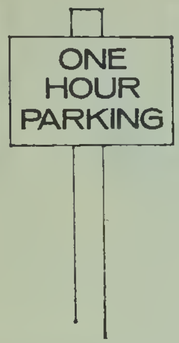
33. Paper is made by mixing and mashing woo with water. The best paper has cloth in it to Which picture shows all the things needed t make the best paper?

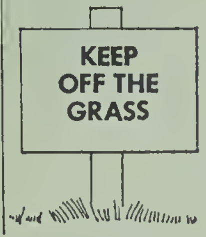


34. One caterpillar found a branch and roll itself into a cocoon. When the cocoon open again it was spring, and a beautiful butterfly fle out. Where was the cocoon all winter?

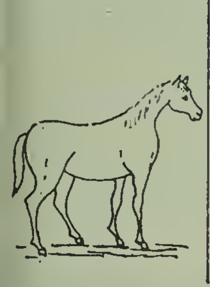
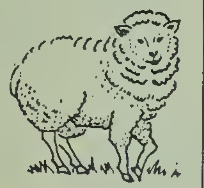
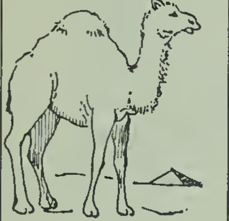
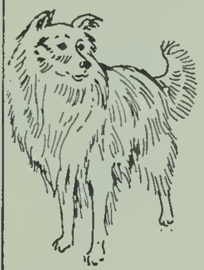




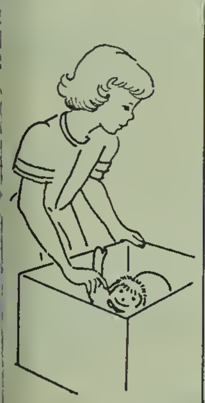
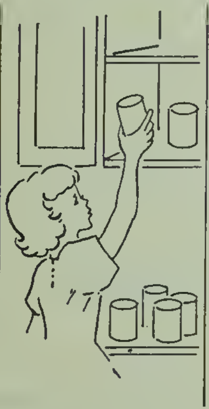
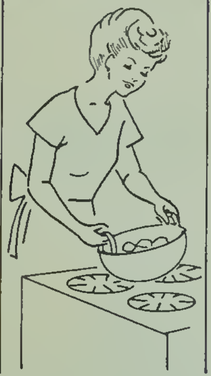
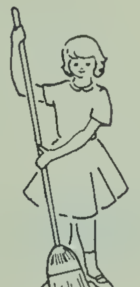




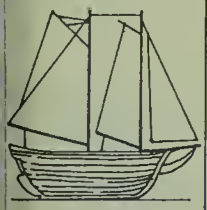
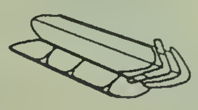
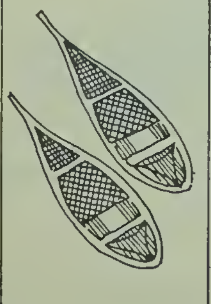
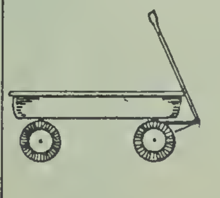
9. Which sign means you should not walk on
e lawn?

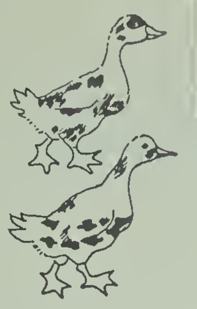
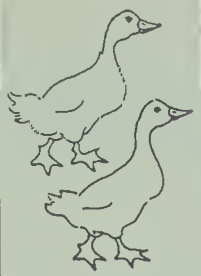
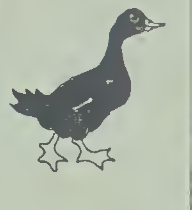
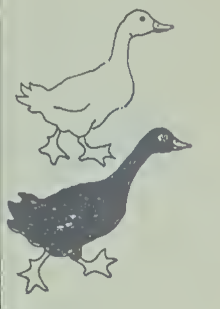
0. The most useful animal in the desert is the
mel. He can travel for a long time without
ater or food. What is the best animal for
ossing the desert?

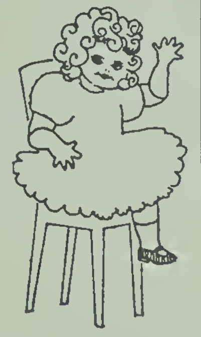
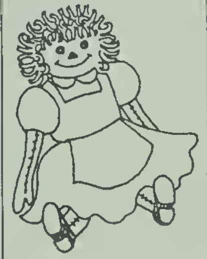
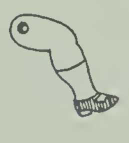
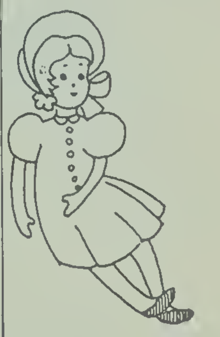
. Mary has been to the store for her mother.
ow she is putting away the cans of food she
ught.

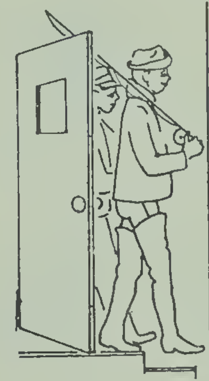
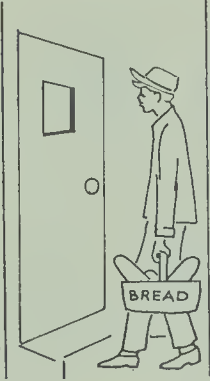
. When it snows in winter, boys and girls take
t their sleds. Mark what they ride on when it
ows.

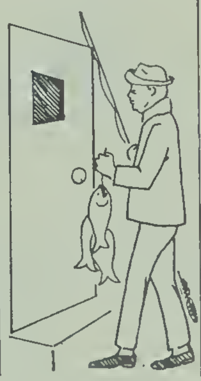
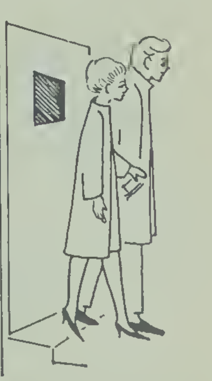





23. Some ducks were walking to the lake. A white duck and a black duck came first. Then came a spotted duck and a black duck. Two white ducks came last. Which ducks came first?

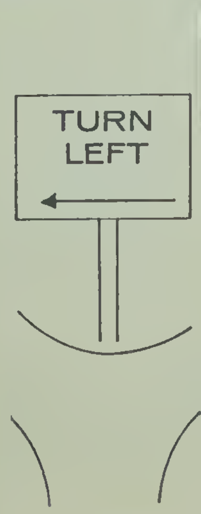





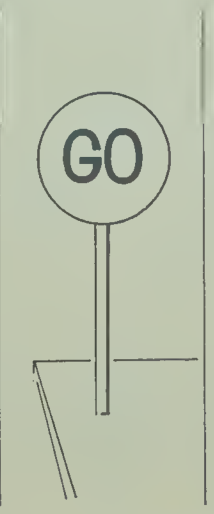
24. One of these dolls has lost her leg. Where is the lost leg?

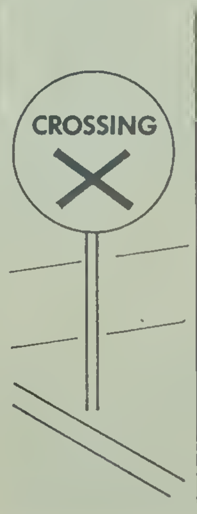



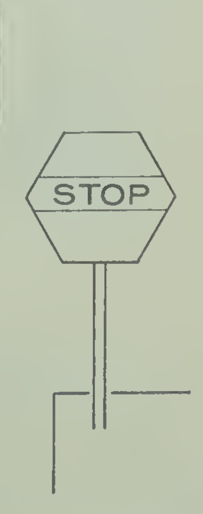



25. Quick as a flash she jumped out of bed. She knew that voice. It was Uncle Ed arriving home at midnight from his fishing trip.

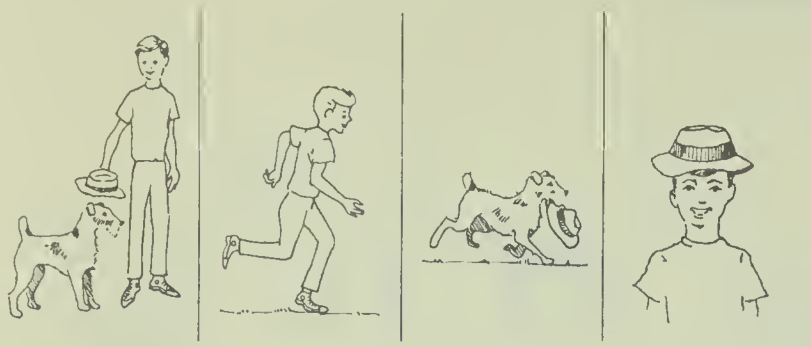




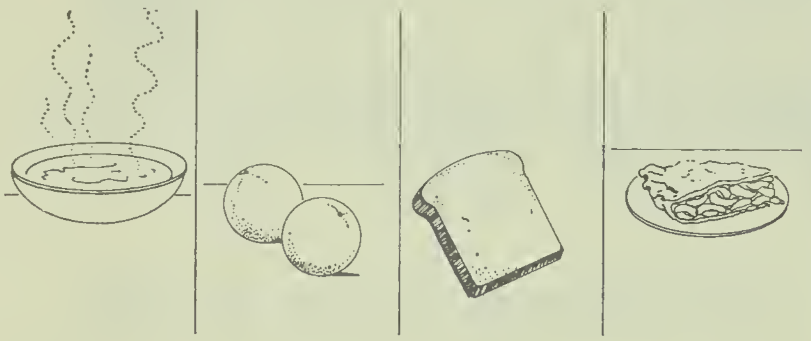




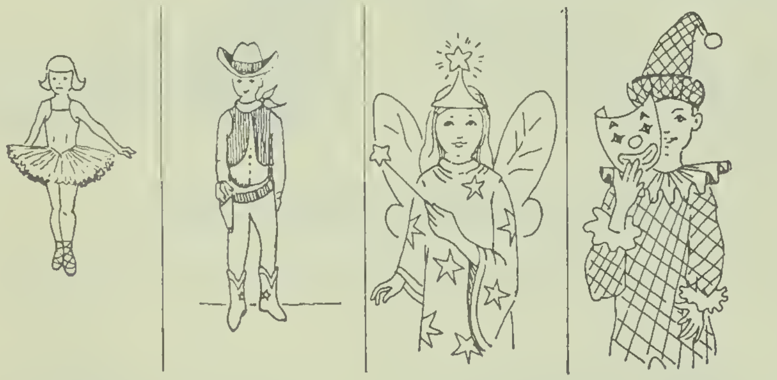
26. Which sign means to stay where you are?



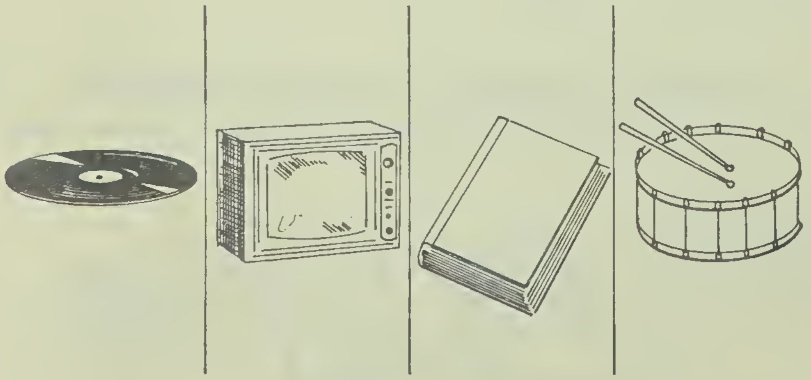
11. The boy is holding his hat over the dog's head.



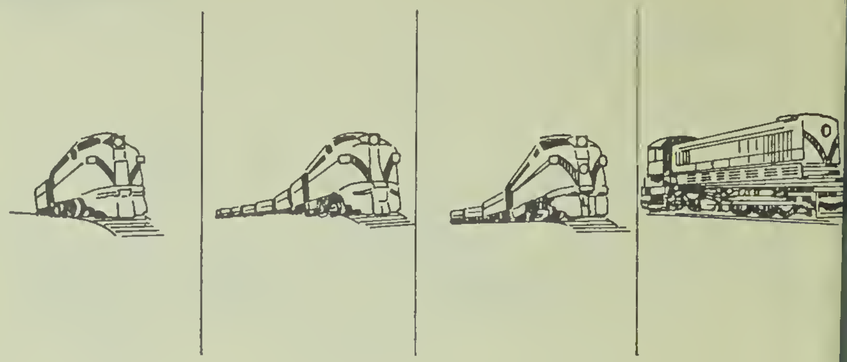
12. For breakfast he wanted a dish of hot cereal.



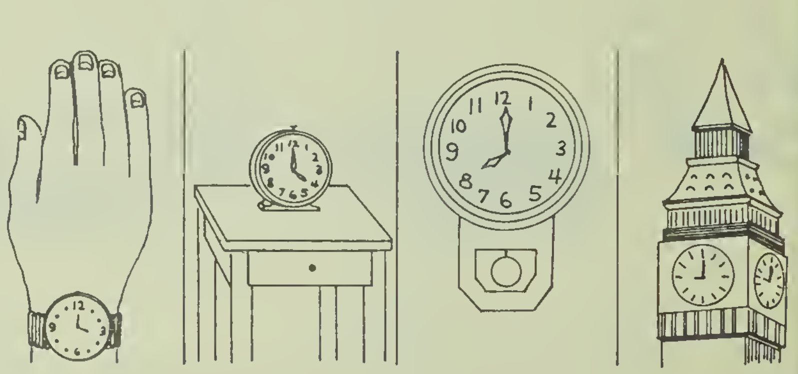
13. He wore a clown mask to the party.



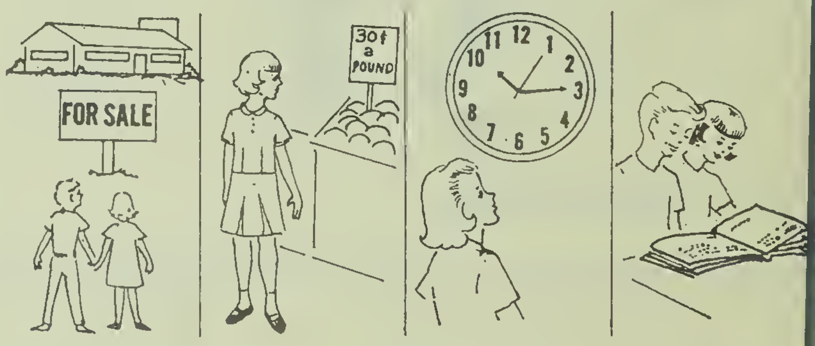
14. She wanted a record to play in school.



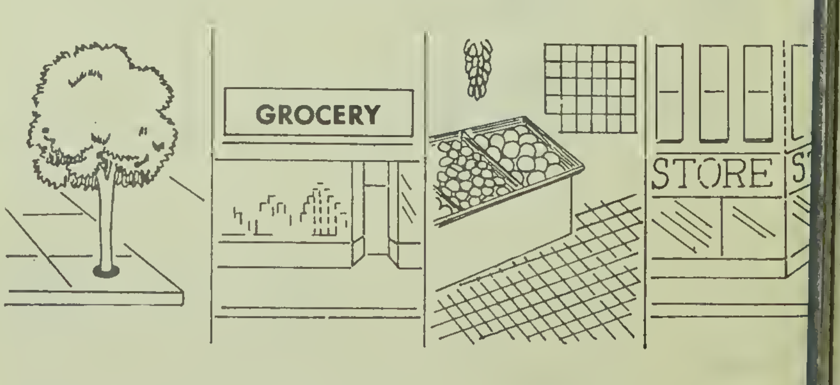
15. Which is the long train?



16. Mark the clock that hangs on the wall.



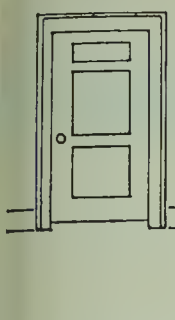
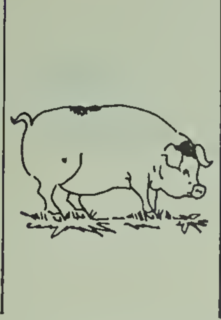
17. They are trying to read the sign in front the house.



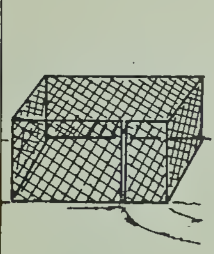
18. The store is at the street corner.

Comprehension

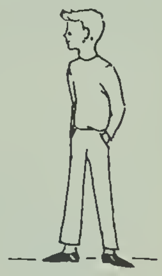
START HERE

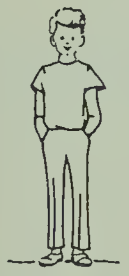
1. Mark the dog.



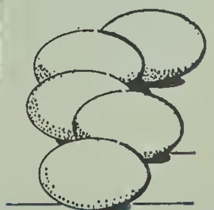
2. Where is the pig?



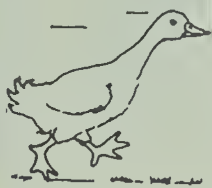
3. This is a bird.



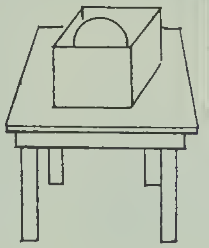
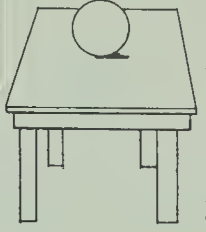
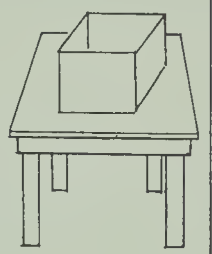
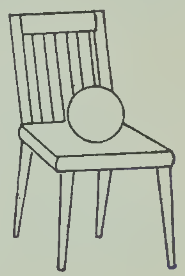
4. Here is the girl.



5. Here are three eggs.

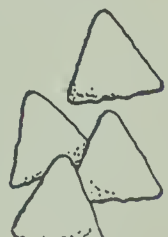


6. Mark the deer that is running away.

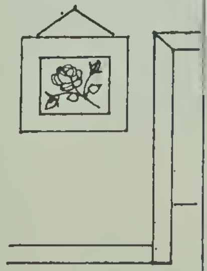





7. The ball is in a box on the table.

8. Mark the goat eating grass.



9. Which cookies are star-shaped?



10. The book he liked best had a picture on the cover.

TURN THE PAGE

APPENDIX D

OTIS QUICK-SCORING MENTAL ABILITY TESTS

Alpha Test Form A

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